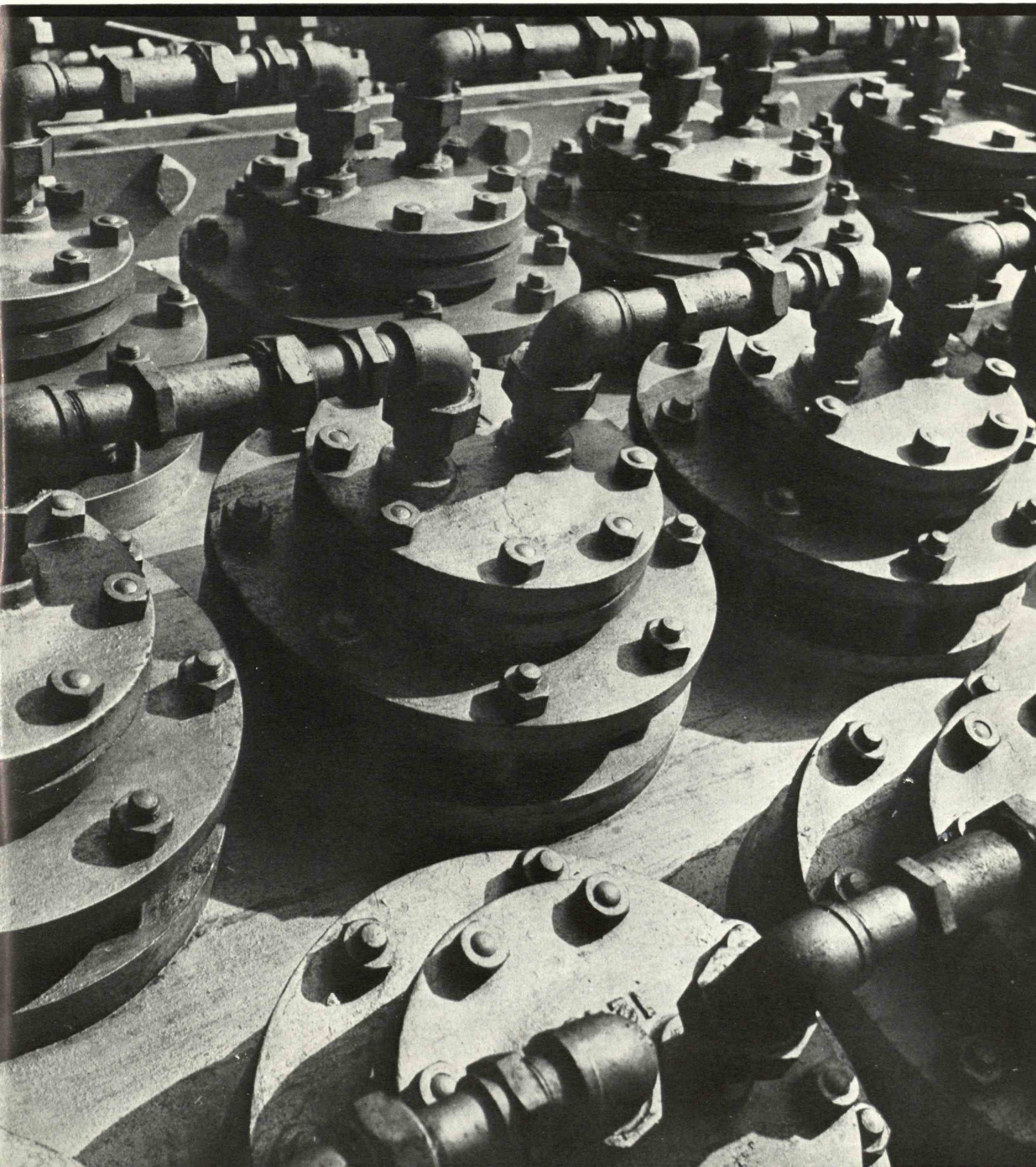
March 1944

TECHNOLOGY REVIEW

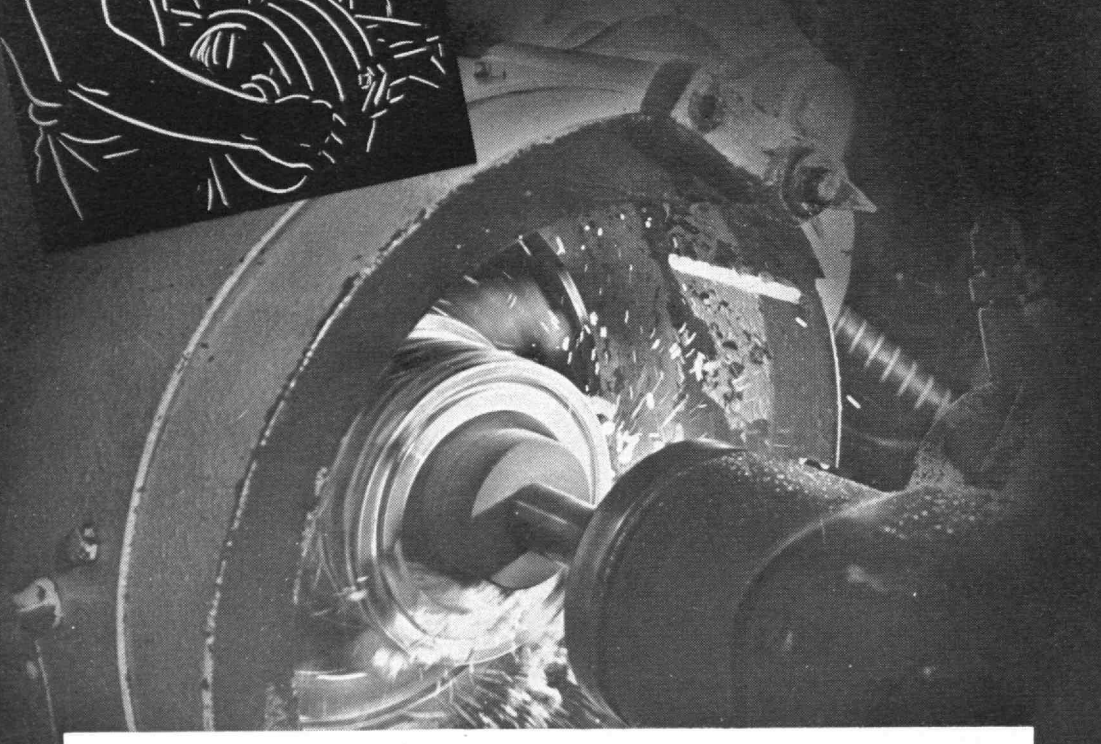
Title Reg. in U. S. Pat. Office



technology
review
Published by MIT

FINE FINISH IS VITAL

Internal Grinding *with* NORTON WHEELS



When the speedy "P-51" Mustang fighter returns to earth, the landing gear is supremely important. North American Aviation builds them precisely, finishing parts to assure dependable and flawless operation.

For this internal grinding operation on a landing gear bushing, a Norton 3860-K5BE grinding wheel is ideal. Combining the features of the Norton 38 Alundum abrasive and BE bond, the wheel has the cool grinding action necessary for heat-sensitive alloy steels and gives the high finish required by the aircraft industry.

NORTON COMPANY, Worcester 6, Mass.

Behr-Manning, Troy, N. Y., is a Norton Division

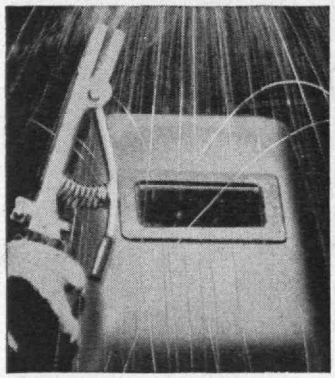
NORTON ABRASIVES

Goggles...Helmets...Respirators... Safety Clothing...Welding Glass

...Look to American Optical for the Personal Protection Equipment Your Men and Women Workers Need!

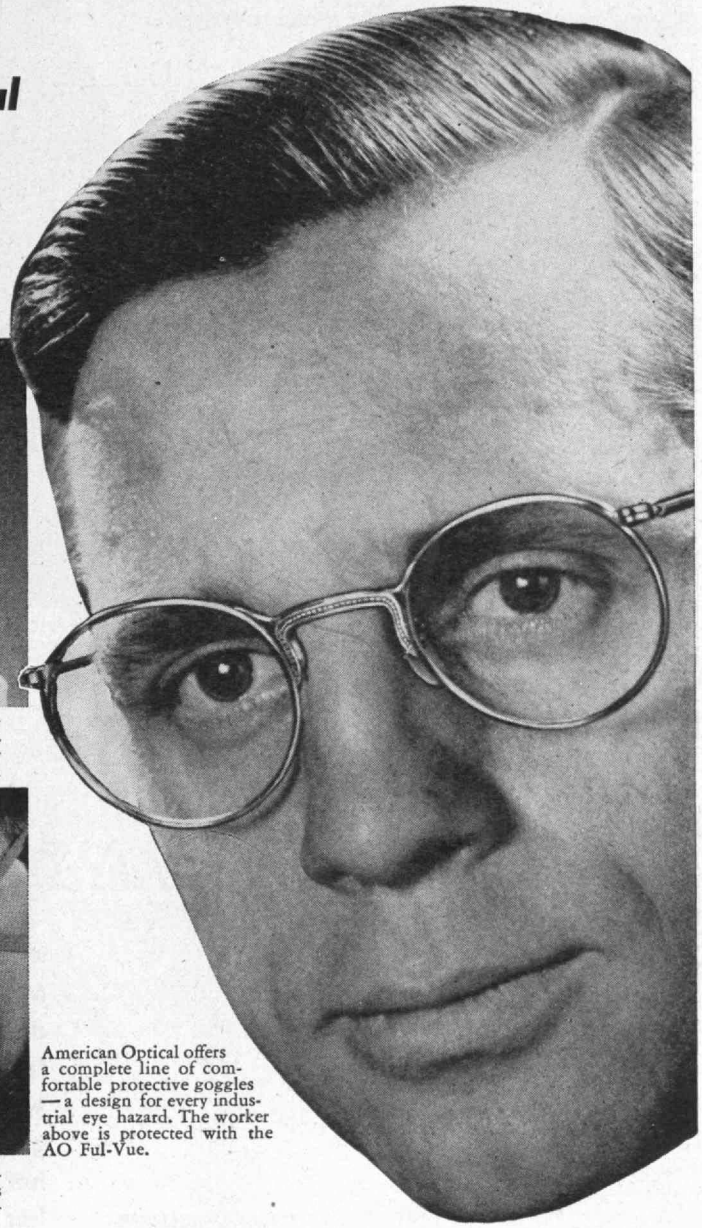
AO Welding Glass for welding goggles includes Noviweld-Didymium, Noviweld and Calibar—all developed by AO Scientists.

Women welders work with greater efficiency and less fatigue in comfortable, smart-designed AO Safety Clothing. Note the smart turban.



AO Welding Helmets are designed to provide maximum protection, flexibility and comfort. Equipped with AO Filterweld Plates.

The American R-9100-T Respirator is light, allows full vision, filters out dangerous toxic dusts. Comfortable face-piece easily adjusted.



American Optical offers a complete line of comfortable protective goggles —a design for every industrial eye hazard. The worker above is protected with the AO Ful-Vue.

American Optical Company head-to-ankles protection is *stay-on-the-job insurance* for your men *and* your women workers. AO Goggles are scientifically designed to give light-weight, comfortable protection for every type of eye hazard in your plant. AO Safety Clothing—of which there are complete lines for men and women—is made to withstand long, strenuous wear, designed and constructed to give comfortable, good-looking fits.

And in addition, American Optical offers you a quickly accessible "base of supply" for AO Safety Equipment, from which is also available the assistance you need to put these products into most effective use. These aids include informative literature, plant analysis of eye hazards, dramatic posters, quickly and easily understandable guides, a goggle adjustment training film and the services of a trained American Safety Representative.

Get in touch with your nearest American Optical Company Branch Office . . . ask to see the complete AO line.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

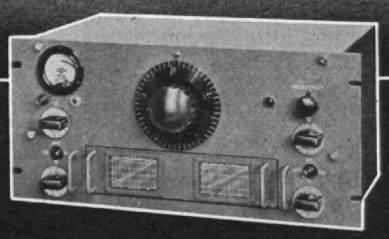
THE TECHNOLOGY REVIEW, March, 1944. Vol. XLVI, No. 5. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

OFFICIAL PHOTOGRAPH
U. S. ARMY AIR FORCE

A LONG WAY FROM HOME!

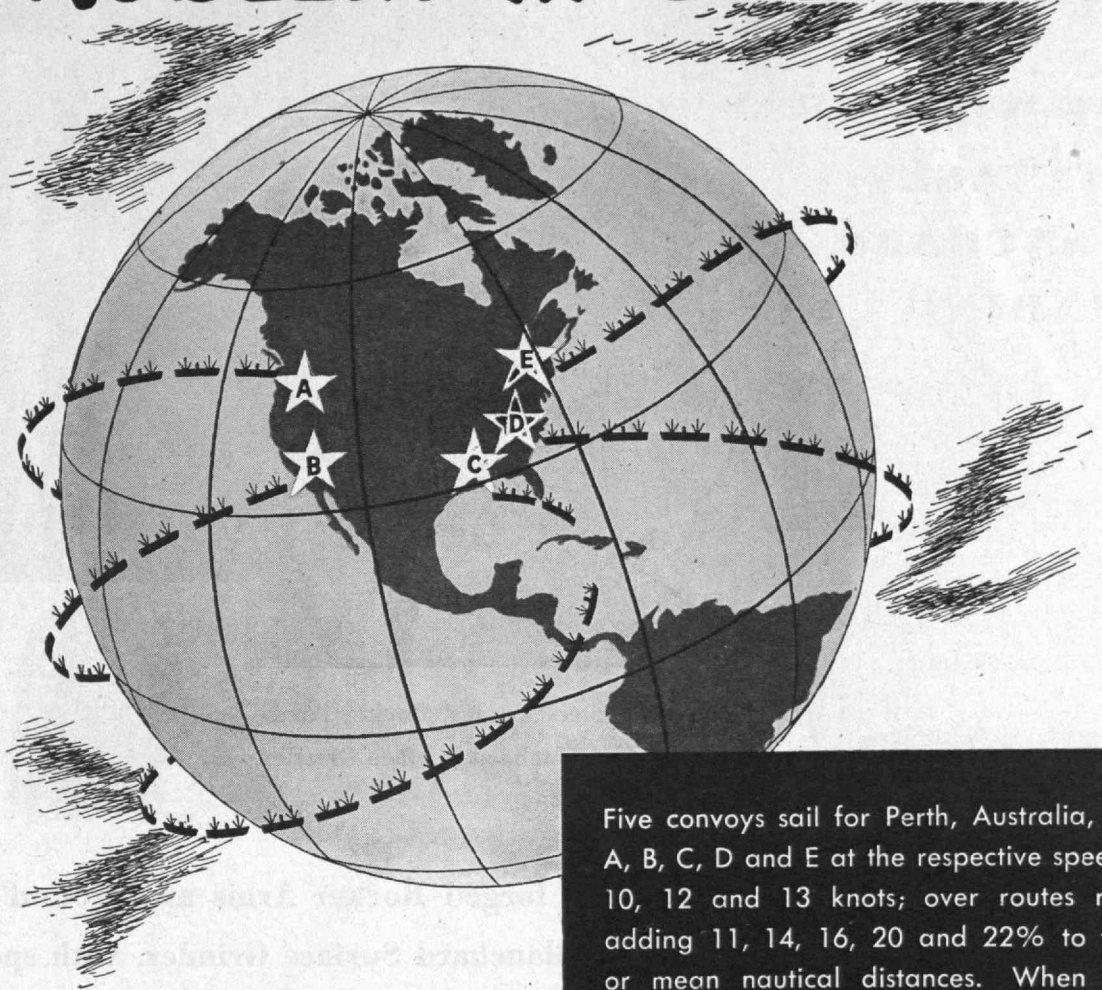
● **Boring into the sunset, this Mitchell has a rendezvous with danger. Armed to the teeth, and freighted with destruction, she will fight her way in to the "target for tonight" and she will fight her way home again. She and her sisters have a deadly job to do, and radio will help them do it.**

Ground stations around the world depend heavily on the HRO receiver for dependable communications with aircraft.



NATIONAL COMPANY, INC.
MALDEN, MASS.

PROBLEM in LOGISTICS!



EVER TRY TO SOLVE ONE LIKE THIS?

Five convoys sail for Perth, Australia, from ports A, B, C, D and E at the respective speeds of 9, 8, 10, 12 and 13 knots; over routes respectively adding 11, 14, 16, 20 and 22% to the normal or mean nautical distances. When must each convoy start in order that all may arrive simultaneously at port of destination about July 1st?

CHARTING the courses and timing the sailings of scattered convoys, composed of ships of many types and speeds, pose complex problems of co-ordination and scheduling.

But certainly no less difficult are the problems of charting a schedule and executing a program for the construction of a chemical, petro-chemical or petroleum refining plant.

TIMING is fundamental. Balance is essential. Co-ordination must be scrupulously maintained.

Frequently, before process engineering is completed, detail design must go on; specifications are written; ordering of materials proceeds; shop and field work must be instituted; labor and supervision provided; cost controls set up. These vital functions of a construction project must be individually manned and supervised—yet co-ordinated and progressively brought into a set schedule.

Plainly, proper scheduling, from process engineering through job construction, is an organization assignment. The Badger organization has specialized for years in the engineering and construction of complete chemical, petro-chemical and petroleum plants. Badger has the key men, the facilities, the organization, and the "know-how" for handling any size contract, anywhere—for assuming complete responsibility from beginning to test-run operation.

E. B. Badger & SONS CO.

BOSTON **EST. 1841**

New York · Philadelphia · San Francisco · London

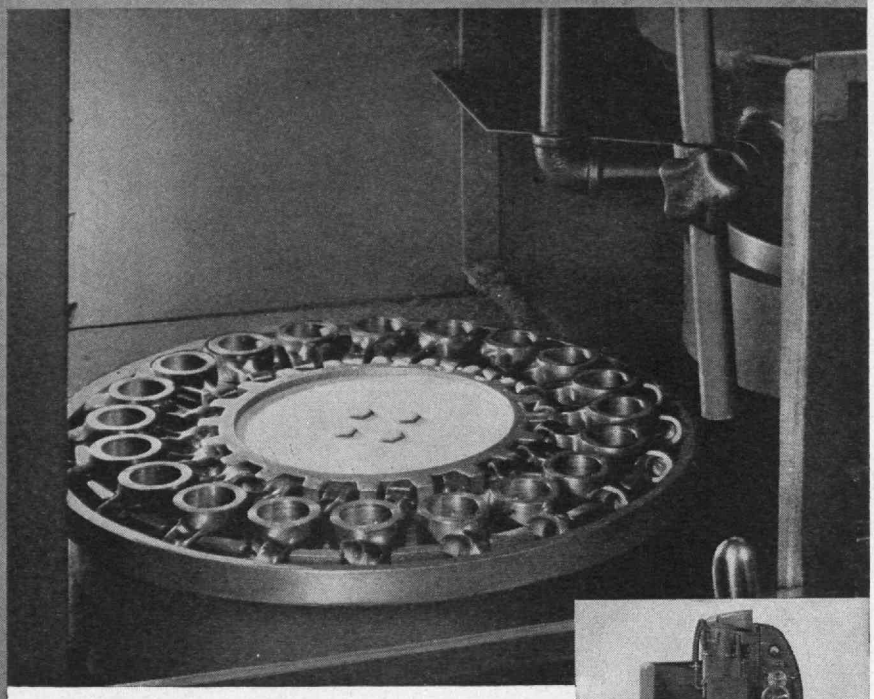
PROCESS ENGINEERS AND CONSTRUCTORS FOR THE CHEMICAL, PETRO-CHEMICAL AND PETROLEUM INDUSTRIES

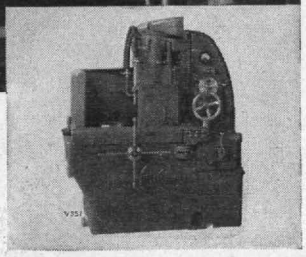
"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ **Production**
- ★ **Adaptability**
- **Fixture Saving**
- **Operation Saving**
- **Material Saving**
- **Fine Finish**
- ★ **Flatness**
- **Close Limits**

★ . . . . . *Especially valuable on jobs like the one illustrated.*





Grinding Steel Forged Rocker Arms on No. 11 Blanchard Surface Grinder

These steel forged Rocker Arms are ground on a No. 11 Blanchard Surface Grinder, with speed and economy.

Twenty pieces are loaded on a special Blanchard designed fixture. .005" of stock is removed from one side.

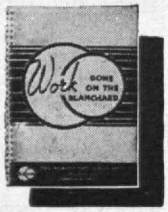
1800-2000 pieces are produced per eight hour shift.

The BLANCHARD

BLANCHARD

MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS.



Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Now Ready...

A Bigger Plant

A Bigger Reservoir of Skill

All discussion of post-war planning makes one fact sharply clear. The world-wide call for Diesel power after hostilities cease will be tremendous —for new enterprises, for rebuilding and because of obsolescence.

The Busch-Sulzer organization will be well equipped to play its part in the world rebuilding program. Since America entered the war our facilities have been greatly expanded and, within the last 18 months, our trained personnel has been increased by 50 percent.

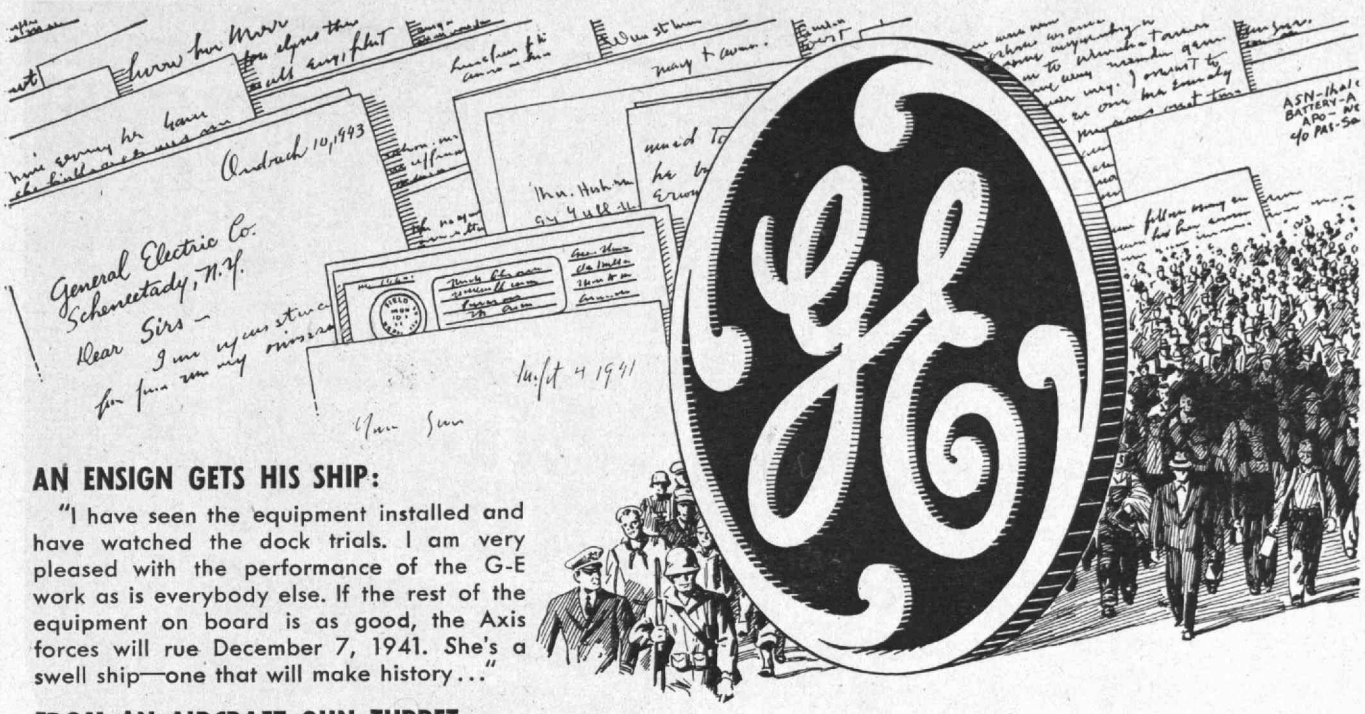
At present we are working 'round the clock on Navy ammunition hoists, Diesel engines for minesweepers, net tenders, ocean-going tugs, U. S. Maritime Commission ocean-going cargo ships and smaller vessels and stationary engines for high priorities only.

When the war is won, work can begin at once upon peacetime projects without long delays for retooling or training. Busch-Sulzer Diesel engines, in unit sizes from 450 BHP upwards, offer a wide range of speeds for different classes of service or drive. They are noted for their low fuel consumption, reliability and long life.

BUSCH-SULZER
ST. LOUIS

BUSCH-SULZER BROS.-DIESEL ENGINE COMPANY
SAINT LOUIS

AMERICA'S OLDEST BUILDER OF DIESEL ENGINES



AN ENSIGN GETS HIS SHIP:

"I have seen the equipment installed and have watched the dock trials. I am very pleased with the performance of the G-E work as is everybody else. If the rest of the equipment on board is as good, the Axis forces will rue December 7, 1941. She's a swell ship—one that will make history..."

FROM AN AIRCRAFT GUN TURRET:

"...It sure is good to sit in a turret and glance around and see the work put out by G-E. Quite a few units in our turrets bear the G-E Monogram. You feel safe when you turn on your power switch and know that all your electric units will work in good order..."

FROM NORTH AFRICA:

"...I have had the opportunity to work with General Electric equipment and it has stood up to the test under extreme conditions.

"Over here in this North African theatre of war we members of the amphibious force are having a very busy time of it. During this time we have yet to find equipment fail us when we really need it. We have been in two of the major invasions over here and have been subjected to relentless attacks from the air. Bombardment generally is very hard on equipment, but as yet none has failed us to the extent we have not been able to use it. I wish to say that all the fellows over here really appreciate that..."

IN THE SIGNAL CORPS:

"...I've run across quite a lot of G-E equipment, especially in radio... As long as the people on the home front keep pouring out such fine workmanship, we have no fear of coming out on the short end..."

NORTH AFRICA:

"...It sure shows the boys here that the G-E is behind the boys 100% and also by seeing all the equipment with the G-E label on it also shows us that the G-E is accomplishing the greatest achievements of all times, not only through quantity but also quality, which all sums up to our slogan of quantity plus quality equals victory, which has been proved here in North Africa. The boys all tell me I could be proud of working for such a great company. I told them that I already knew that..."

One of the Promises Men Live By

AT THE TOP of the page is one of today's *anti*-Swastika symbols. There are thousands of others. Each trade-mark of an American company producing for war is such a symbol.

What makes these symbols important is what has been put into them by the men and women producing this war equipment, and the way this equipment will be used—by American boys against the Axis. But the way the men in the armed services feel about these symbols is important too.

The letters quoted in part at the left tell how some of these men—General Electric men now in the Army, the Navy, the Marine Corps—feel about one of these symbols, the G-E Monogram, the trade-mark of General Electric.

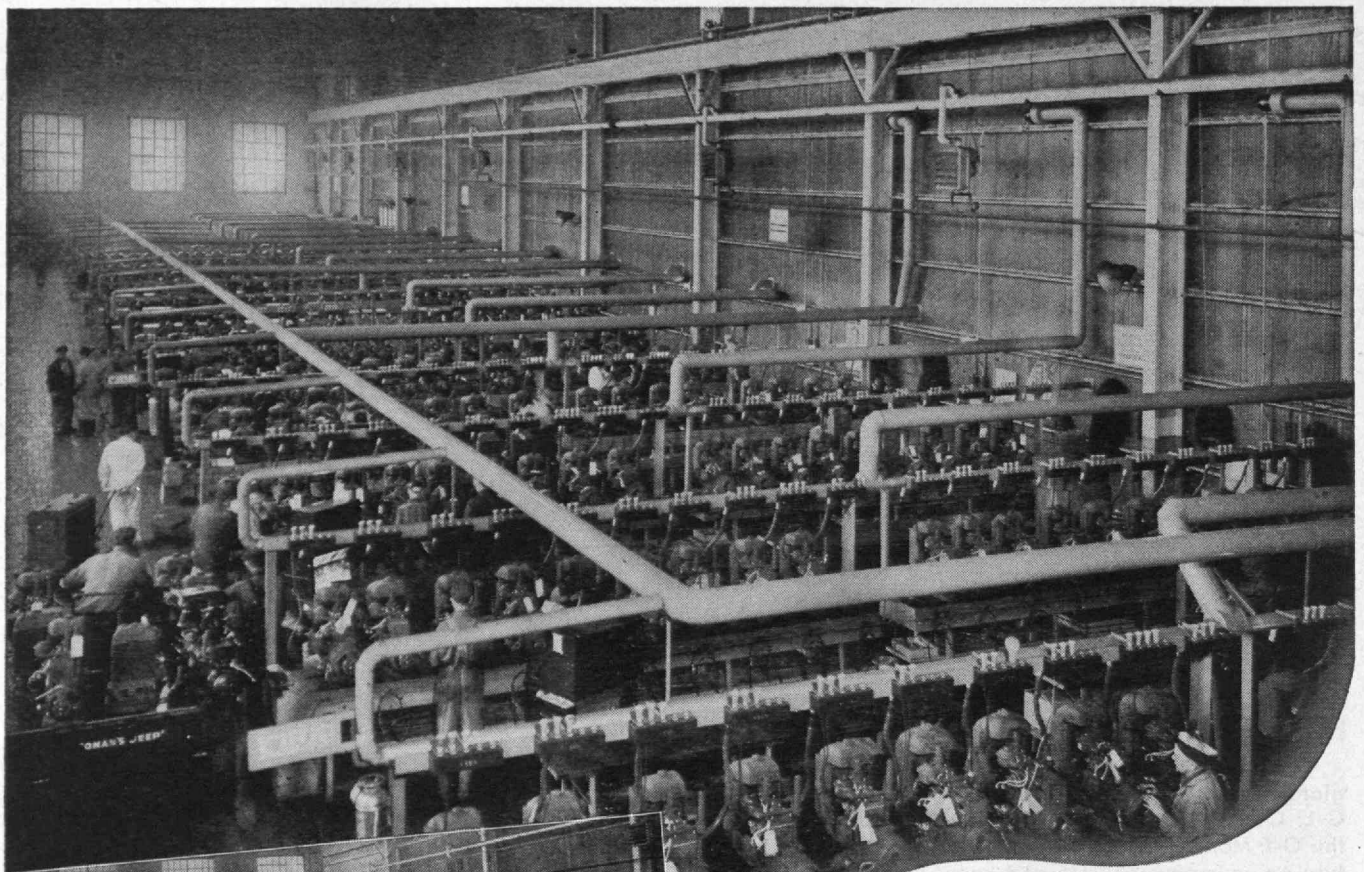
We, 192,000 G-E men and women, are producing material today for almost every battlefront in the world. We are going to keep on producing this material to the limit of our productive capacity, to the highest of our quality standards, as long as it is needed by American boys anywhere on earth. This is no more than simple duty. But the Monogram we send along on every piece of equipment is something more. It is a message, and a promise, from us to the boy who is going to use that piece of equipment. We are glad that he understands this message. It is, God willing, a promise that he can live by.
General Electric Company, Schenectady, N. Y.

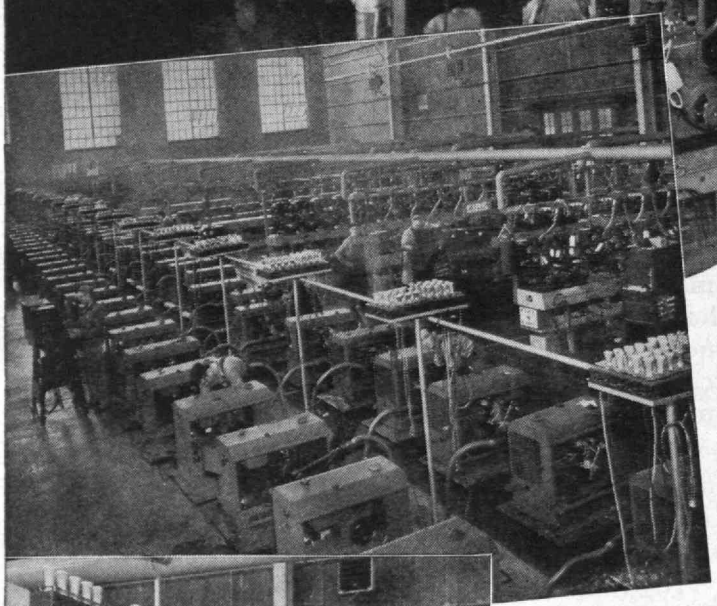
BACK THE ATTACK BY BUYING WAR BONDS

GENERAL ELECTRIC

962-605C-211

Hear the General Electric Radio Programs: "The G-E All-girl Orchestra" Sunday 10 p.m. EWT, NBC—"The World Today" news, every weekday 6:45 p.m. EWT, CBS.





Here is One of Many Problems PENFLEX *Has Helped to Solve . . .*

Illustrated, Onan Generators on test in world's largest test rooms.

The Onan plant was one of the first to solve the problem of exhaust heat. They installed PENFLEX Flexible Metallic Exhaust Pipes to convey exhaust heat from generators on test to main distribution system where it is routed to other operations and re-used. A PENFLEX Flexible Metallic Exhaust is packed with each generator to be used wherever Onan sets are found.

Four-wall interlocking joint construction, flexibility, and insulation against vibration make PENFLEX suitable for such a job.

PENFLEX Flexible, All-Metal Hose or Tubing is also available for bilge ventilation, dust collection, coolant conveying, vibration isolation, hydraulic and air controls and many other applications.

Perhaps you, too, have a similar problem. If so, our Engineering Department will help you solve it.

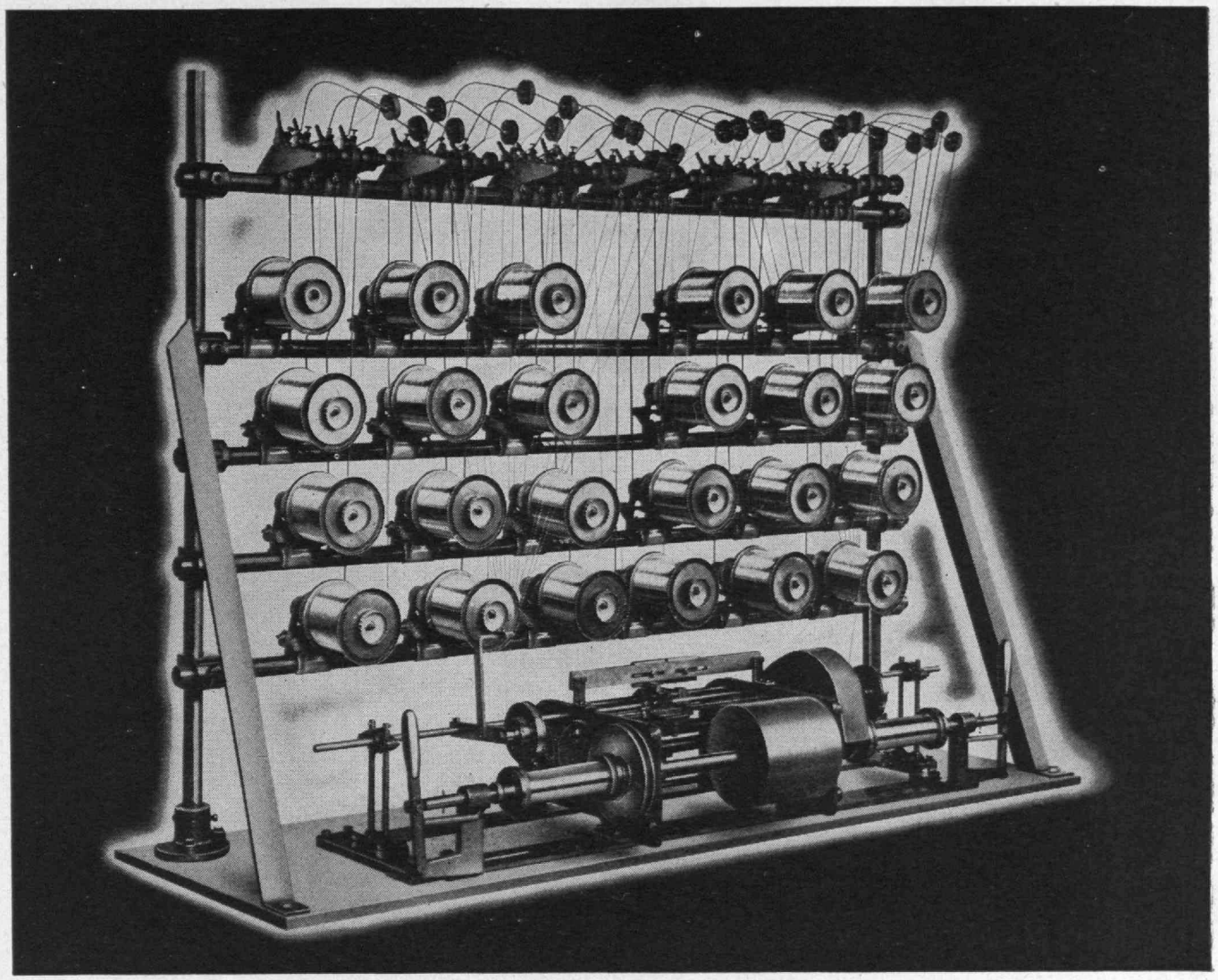
PHOTOS COURTESY D. W. ONAN

PENFLEX METAL HOSE

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7211 Powers Lane, Philadelphia 42, Pa.

ESTABLISHED 1902



Another FIDELITY Machine — for winding wire

The one illustrated is for the multiple-end winding of fine wires—sizes .008 to .030 up to twelve ends on each spool.

Other FIDELITY Wire Spoolers take care of an unusually wide range of wire winding on sticks, spools, reels or quills.

All deliver a smooth, uniform lay at speeds from 40 to 800 feet per minute—depending on kind and size of wire. Controls are either screw traverse or hydraulic as required by type of package.

Special type FIDELITY machines for winding such products as plastic tapes, surgical thread, ultra-fine filament wires, etc., frequently combine additional functions like inserting the wound package into a container.

Write for new catalog of FIDELITY Wire Spoolers.

Buy More Bonds

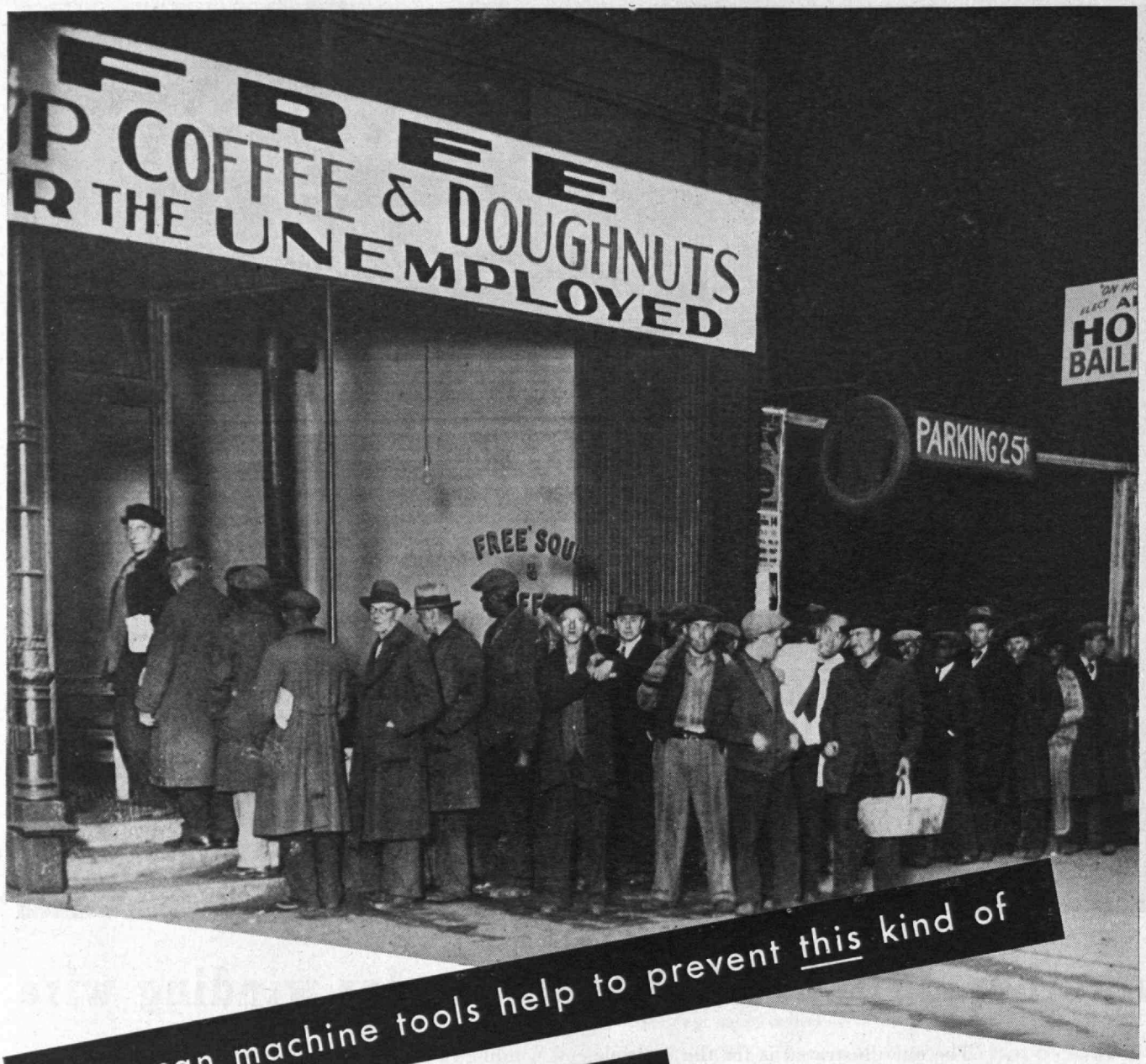
ARMY E NAVY

33 YEARS' EXPERIENCE

Designers and Builders of Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.



How can machine tools help to prevent this kind of Victory?

Remember the big parade of the breadline— the march of the bonus army — the victorious men selling apples? Many an American hero tasted those bitter fruits of victory, and the war to end war ended nothing.

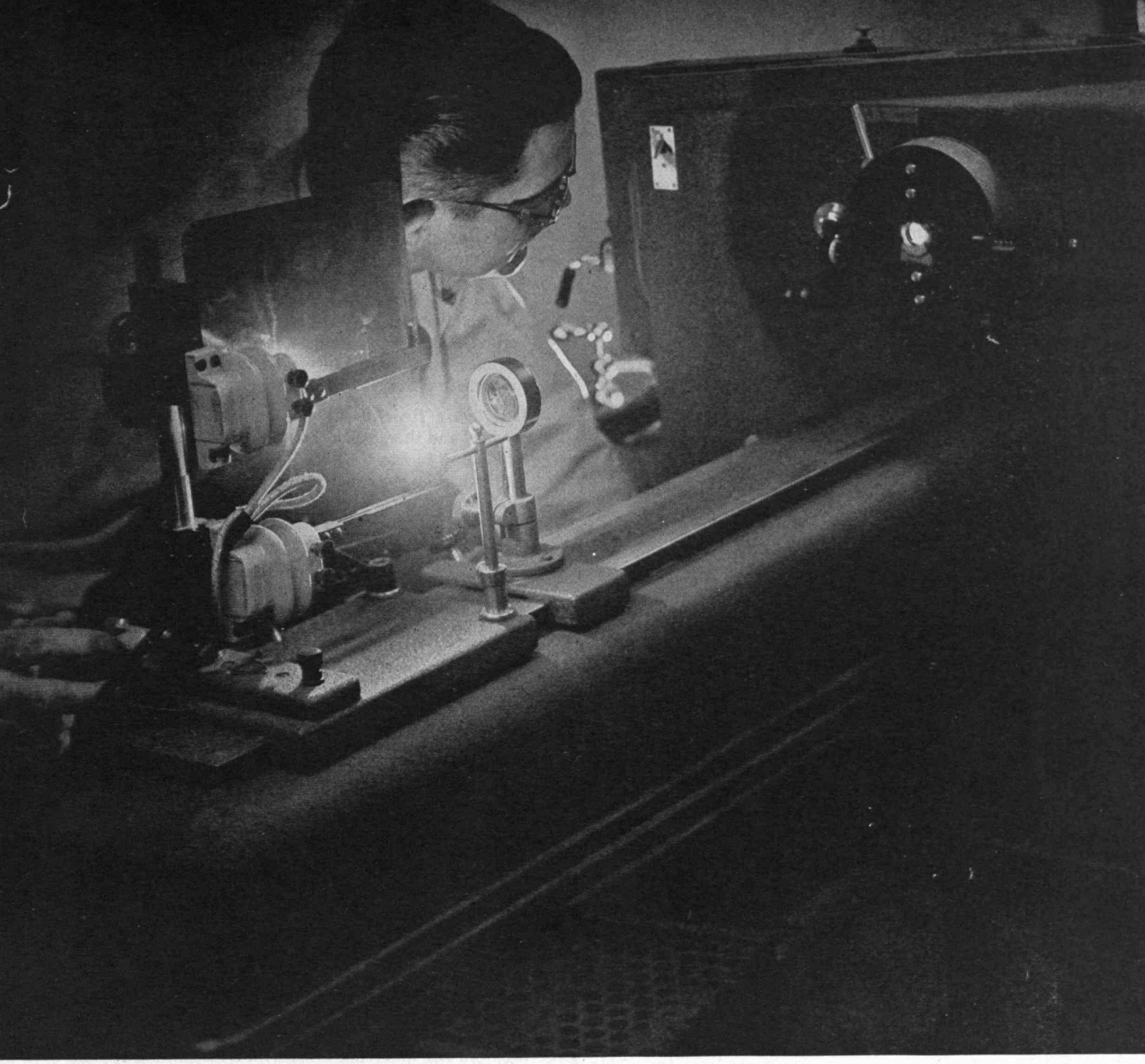
What kind of victory will this one be? It *can* be the great one American boys are giving their lives for — but they alone can't make it so. For victory in peace, as in war, must be planned ahead . . . and in peace, *you're* one of the Generals.

If you are a manufacturer, there is a small group of basic machine tool engineers who can help you to plan now for the kind of victory we've told our sons they're fighting for.

One of these engineers is a Bryant man. We urge you to call him today. For his specialized knowledge of internal grinding machinery is important to the manufacture of literally *everything* that will make this country a finer place: this victory a victory that we shall not be ashamed of.

BRYANT

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.



The Spark that Lights the Flame of Victory

A pinpoint of fighting metal placed in the arc of the spectrograph writes its own signature on a photographic plate. Inside the instrument, the light from that flame is broken up by a prism as a prism breaks up sunlight. Each element identifies itself by a series of characteristic lines, always the same for the same basic element. It reveals to the spectrographer each constituent, what impurities are present and in what quantities.

Thus spectrography helps in controlling inspection. It keeps tough fighting steels tough, helps in development of new fighting metals. Spectrography is used too in other fields . . . chemicals, foodstuffs, vitamins. It speeds research, control, and analysis. Today, spectrography is helping to build the tools of Victory as in peacetime it helps to make better cars and better breakfast foods.

Because Bausch & Lomb had long experience with such precision optical equipment needed in education, research, and industry, it was ready for quantity production of precision optical instruments of war such as gunfire control instruments, binoculars, and aerial photographic lenses. When the last gun is fired, Bausch & Lomb will devote its enlarged experience to peacetime optical production. Through war and peace, Bausch & Lomb has continued . . . and will continue . . . to do the job it knows how to do best. *Here again optical science is seeing it through.*

For Bausch & Lomb Instruments essential to Victory—priorities govern delivery schedules.

BAUSCH & LOMB

OPTICAL CO. • ROCHESTER, N. Y.

ESTABLISHED 1853

AN AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION

THE TABULAR VIEW

Alma Mater. — The soil as source of mankind's nourishment must itself be nourished if man is to be best served. What proper treatment of the soil can mean and what inattentive exploitation of it does mean are discussed for The Review (page 259) by WILLIAM A. ALBRECHT, chairman of the department of soils, college of agriculture, University of Missouri. Dr. Albrecht writes with authority — he has long been a teacher of soil science and his own researches into soil treatment have concerned bacteriology, nitrogen fixation, the inoculation of legumes — and with the vigor of one convinced of the extreme importance of the subject.

Beneficent Broth. — The progress of events on the medical and therapeutic frontiers of research is surveyed from time to the time for The Review by RUDOLF E. GRUBER, who since his graduation from the Institute in 1916 has been closely associated with the increasingly thorough applications of science to the checking of disease. Vice-president of Merck and Company, Inc., Dr. Gruber speaks from intimate understanding in discussing (page 262) recent advances in the utilization of the antibacterial powers of penicillin, the substance produced by the mold *Penicillium notatum* which has been conspicuous in the news during the last half dozen years.

Terra Incognita. — The yarn of how numerous skippers and several nations were baffled by an elusive island is spun in this issue of The Review (page 264) by WILLY LEY, whose special interest in the history of science has led him down many bypaths of incidental information. A native of Berlin, Mr. Ley left Germany in early 1935, coming to the United States, of which he will soon be a citizen. One of the founders of the German Rocket Society and later coeditor of its journal, he is the author of a volume, *Rockets*, scheduled by the Viking Press for publication this month. He is a member of the staff of the newspaper *PM*.

Left-Right. — A phenomenon of comparatively recent utility in the world of chemistry is that of stereoisomerism — the existence of different substances whose molecules possess an identical structure but different spatial arrangement of their atoms. The optical activity resulting from this difference is basis for a fascinating account of research which FREDERIC W. NORDSIEK has prepared for this Review (page 266). Since his graduation from the Institute in 1931, Mr. Nordsiek has been engaged in bacteriological research, public health administration, public relations, and teaching. He has recently joined Standard Brands, Inc.

Home Production. — The case for prefabrication as a means of bringing to the building industry the advantages in economy and efficiency to be gained from regulated mass production is cogently stated (page 256) by WILLIAM W. RAUSCH, of the Institute Class of 1917, who during the past decade and a half has been active in varied phases of housing. As president of the Holt-Fairchild Company, manufacturers of prefabricated houses, Mr. Rausch has had much to do with the production of defense housing during the war, one project by his firm having been officially cited for excellence.

Information supplied by an Industrial Publication

The loss of recoverable alloys in steel scrap has been a major problem confronting the various conservation agencies. Proper segregation of scrap is one effective answer.

Segregation of scrap at the source is comparatively simple. The difficulty comes in preventing mix-ups in subsequent handlings. They can be prevented or remedied by applying two simple tests—spark and spot.

The presence of molybdenum, or nickel, or both, is readily detected by spark testing. Molybdenum causes an easily recognized secondary burst at the end of the spark stream resembling a spearpoint. Nickel produces a spot of intensely white light in the stream near the grinding wheel.

Both elements have a tendency, in the higher contents, to suppress the supplemental bursts characteristic of carbon steels.

Several spot tests for molybdenum have been developed. The simpler ones depend on the red color produced by either potassium ethyl xanthogenate or sodium thiocyanate added to a molybdate obtained from the etched surface of the steel. The dimethyl glyoxime test for nickel also depends on a red coloration. Many of these tests are approximately quantitative.

MAIL RETURNS

Mighty Pen

FROM ALFRED L. FITCH, '84:

The reference made on page 133 of the January issue of The Review to Waterman's commercial manufacture of the fountain pen in 1884 prompts me to ask why you did not mention the stylographic pen that was in common use before that time. I entered the Institute in September, 1880, and used one of these pens at that time or very soon after. I have notes made with it which are dated 1882, and believe that I had used it for some time when these notes were made. I cannot, however, say how long. Have you information about these stylographic pens? A pen currently advertised looks much like the stylograph that I used during student days.
North Easton, Mass.

The Review's survey of anniversaries in its January issue was confined to those ending in –4; hence the stylographic pen was necessarily ruled out. Two patents for pens of this type were issued in 1879, and in the following year no less than 17 patents for stylographic pens are found. The pen which Mr. Fitch used at the Institute in 1880 must have been among the earliest manufactured. —ED.

Welcome Addition

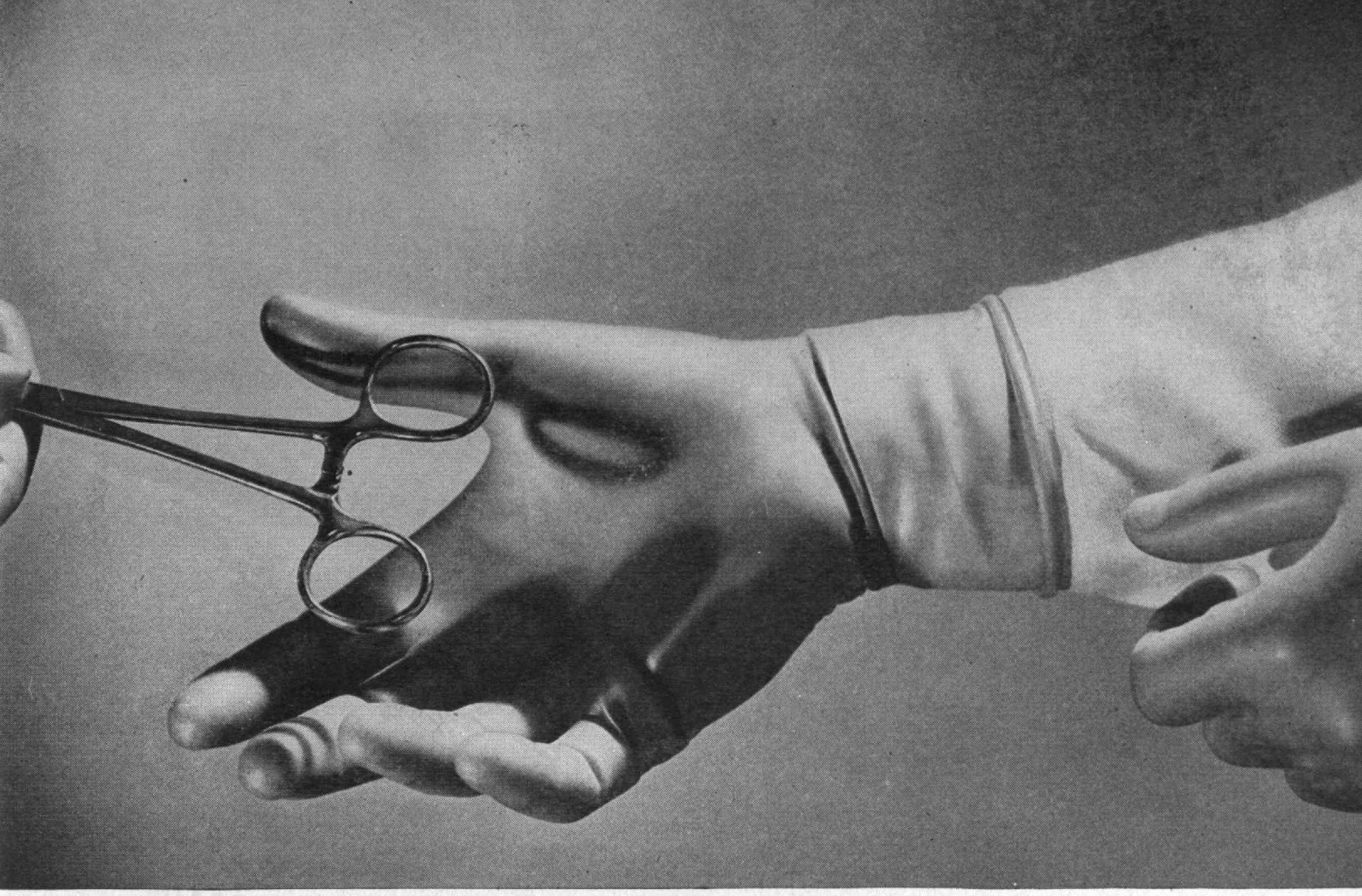
FROM F. ALEXANDER MAGOUN, '18:

Dr. Edward E. Hitschmann, who ran Sigmund Freud's clinic for more than 40 years, is now living in Cambridge. Together with Mrs. Hitschmann he was our guest recently. During the evening's conversation, he coined a word which I feel ought to become part of the English language. Certainly many of us could use it.

The word is "impert." An expert is one who has had experience enough to know what he is talking about. An impert is one who is impertinent enough to think that he knows what he is talking about even without having had experience.

I should welcome your sharing this contribution to the richness of our vocabulary by publishing the world "impert" and the definition of it in the columns of The Review.
M.I.T., Cambridge, Mass.

Not only psychologists and students of human behavior but also editors and schoolmasters, not to mention many a radio listener, may be expected to feel hearty agreement that there is room and aplenty for the term which Dr. Hitschmann has provided. — ED.



Hands that Command the Nation

THE TECHNICAL KNOWLEDGE, the ingenuity and the resources of America are at the disposal of our skilled medical officers on the fighting fronts of the world. They command every aid the nation can supply. That is one reason why a wounded man's chances of survival are greater today than they have been in any other war.

Among the materials that are helping medical men in their fight to save lives are the *stainless steels*. Used in operating tables, surgical instruments and in other medical equipment, stainless steels are serving in hospitals in this country and overseas.

Frequent sterilization with high temperature steam or strong disinfectants will not injure stainless steels. Their smooth, hard surface is easily kept free from germs that can cause fatal infection. Even in the damp tropics, stainless steels do not rust. Tough and durable, free from the possibility of chipping, stainless steels can withstand the rigors of wartime use.

On the home front, too, stainless steels are making their contribution to the health of the nation. Because they are easier to clean and keep clean than other metals, they are widely used in equipment necessary to the processing, preparing and serving of foods. They keep their bright finish, impart no flavor to food, and resist food chemicals. They will be used increasingly in restaurants, in the home, and in many industries where their unique properties are so desirable.

Stainless steels are "stainless" because they contain more than 12 per cent chromium. Low-carbon ferrochromium, a research development of ELECTRO METALLURGICAL COMPANY, a Unit of UCC, is the essential ingredient in the large-scale production of stainless steel. Units of UCC do not make steel of any kind. They do make available to steelmakers many alloys which, like ferrochromium, improve the quality of steel. The basic research of these Units means useful new metallurgical information—and better metals to supply the needs and improve the welfare of mankind.

▼

Members of the medical profession, architects and designers are invited to send for booklet P-3, "THE USE OF STAINLESS STEELS IN HOSPITALS." *There is no obligation.*

CARBON FOR HEALTH. Research by a UCC Unit has resulted in different forms of carbon used in milk irradiators, "sun" lamps, gas masks—and in air conditioning installations.

GASES FOR HEALTH. LINDE oxygen U.S.P. made by a Unit of UCC is used by the sick in hospitals and at home—and it contributes to the safety of our high flying aviators.

CHEMICALS FOR HEALTH. Synthetic organic chemicals, developed by a Unit of UCC, mean better anesthetics, more plentiful sulfa drugs, vitamins and other pharmaceuticals.

PLASTICS FOR HEALTH. BAKELITE and VINYLITE plastics, produced by UCC Units, mean sanitary paints, floor coverings, sheeting, "burn sleeves" and other essentials.

BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

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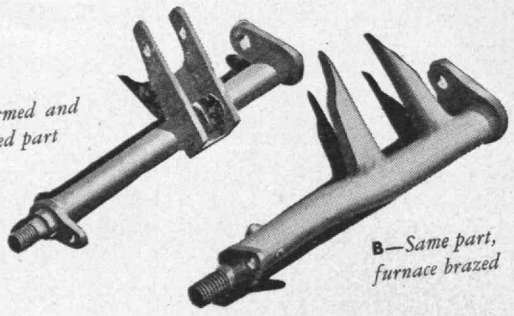
Trail Blazing in the Skies

PIONEERING NEW METHODS

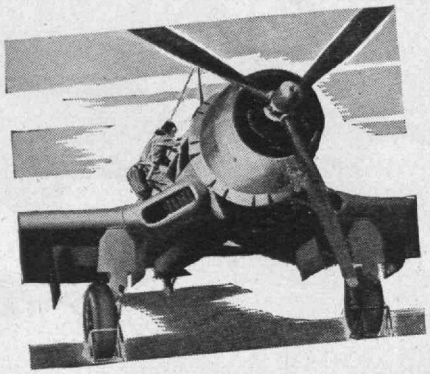


A—*Formed and welded part*

B—*Same part, furnace brazed*

ELECTRIC FURNACE BRAZING OF PARTS INTO ASSEMBLIES—a highly successful Goodyear Aircraft adaptation of furnace brazing permits assembly from simple machine parts of many items that formerly had to be "hogged out" or welded—saving time and labor, and producing a strong part at low cost.

BUILDING PROVEN AIRCRAFT



THE DEADLY FG-1 CORSAIR FIGHTER is being built by Goodyear Aircraft, now one of its principal producers. The quality of Goodyear craftsmanship and methods, as demonstrated in production-line output of this "hot" airplane, has won high commendation from the U. S. Navy.

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LET'S ALL BACK THE ATTACK—WITH WAR BONDS

GOODYEAR AIRCRAFT

VOLUME 46 NUMBER 5

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Three Lions

A Chinese ropemaker. With this simple wooden hand twister, he produces about a thousand yards of three-strand hemp rope in a day.

CONTENTS for MARCH, 1944

THE COVER — SETTLING TANKS AT A SODIUM PLANT
From a photograph by Ron Partridge from Black Star

☆ ☆ ☆

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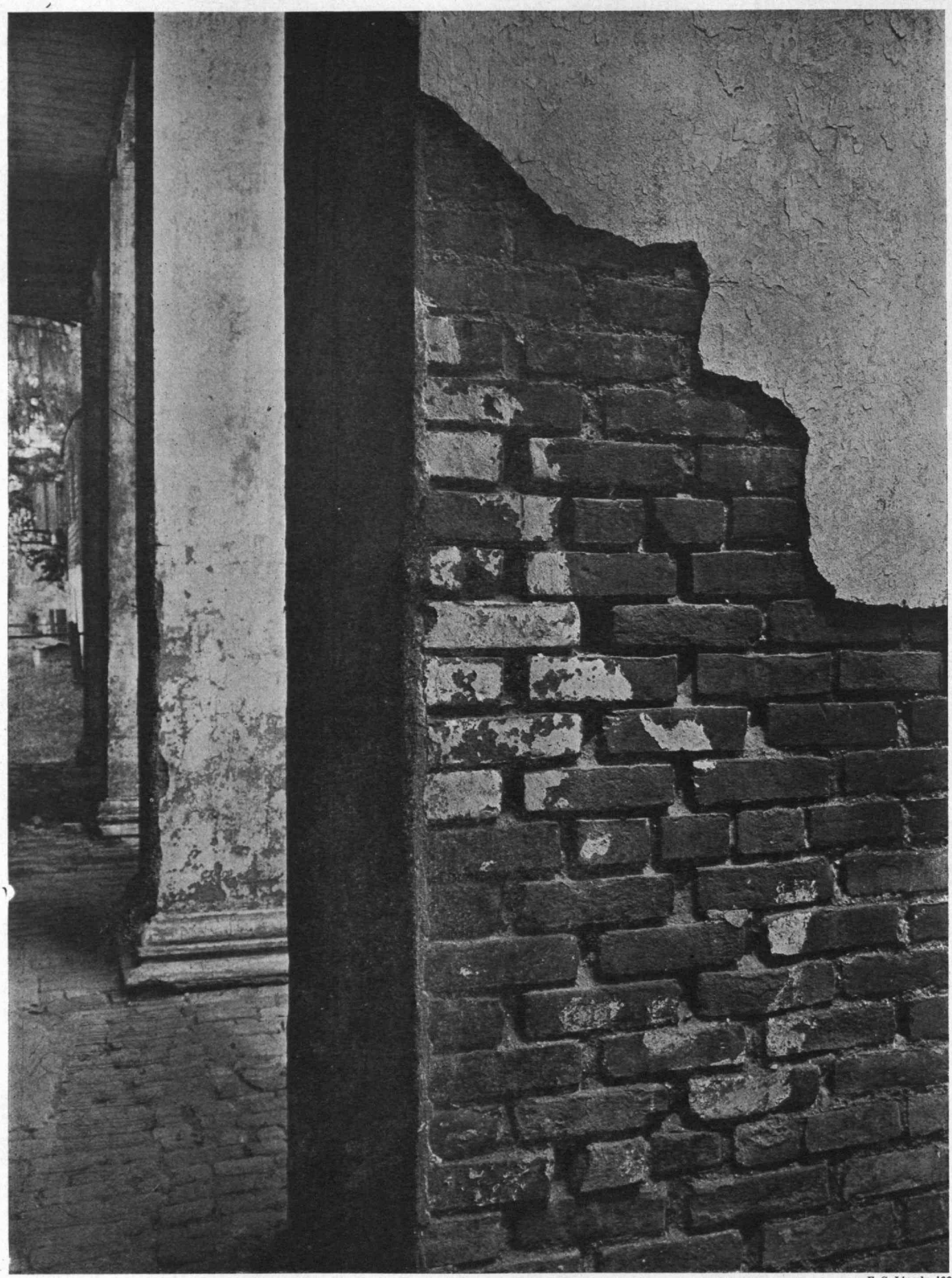


F. S. Lincoln, '22

TEXTURE

Stucco and brickwork at "Belle Helaine," between Baton Rouge and New Orleans

THE
TECHNOLOGY
REVIEW

Vol. 46, No. 5

March, 1944

The Trend of Affairs

Keeping Their Bottoms Clean

ADMITTEDLY, dry docks do not have what an Army paper once described as "glammer." Large, box-like structures, they ordinarily attract the attention only of civil engineers and shipowners. But ever since ships became too big to be careened or beached when their bottoms had to be scraped or repairs had to be made, dry docks have been essential elements in the operation of naval and merchant fleets, their location playing an important part in establishing spheres of control. The increased building of ships (some of which are constructed in dry docks), the more rapid wear and tear following intensified use of shipping, and the problem of enemy-inflicted damage have imposed a heavy load on this country's dry docks. One large Navy dry dock was put to use before completion; a temporary bulkhead across its mouth permitted work to be started on the construction of a battleship while the gate portion of the dock was being finished.

Included in the Navy's dry-dock building program of $511,000,000 are 28 large masonry dry docks for major bases along the Atlantic and Pacific coasts of the United States (and, doubtless, dry docks for points closer to the fighting areas). Representative of the masonry type are the new docks at Philadelphia, each with a usable length of 1,100 feet, a width of 150 feet, and a depth of 33.8 feet over its sills at low water. The preparation of the foundations for one of these docks required the excavation of some 1,250,000 cubic yards of material, and each dock with its appurtenances involved the placing of approximately 500,000 cubic yards of concrete. The associated pumping plant is capable of emptying in two hours the huge volume of water indicated by these figures. One reason for the great weight of dry docks is that, aside from the stresses they must endure because of the weight of ships placed in them, they must frequently be built in locations which expose them, when empty, to enormous upward hydrostatic forces. In other words, they want to float away. In addition to being anchored to the subsoil with numerous steel piles, the concrete floors of the new Philadelphia docks are 14 feet thick, by no means an unusual figure. Many of these new docks are being constructed with the aid of a tremie method (deposition under water) of pouring concrete. Originated by Rear Admiral Frederic R. Harris (retired), it has permitted material savings in time. A dry dock at Pearl Harbor built by this method in 20 months was completed shortly before December 7, 1941.

The Navy is also building floating dry docks, welded steel structures that can, if necessary, follow the fleet, as smaller ones in Britain did during the first World War. Floating dry docks are no novelty, having been invented by a hard-pressed shipmaster during the reign of Peter the Great. His ship badly in need of attention and with no facilities in the harbor of Kronshtadt (a port near Leningrad), the captain bought a large old hulk, gutted it, replaced the stern with a gate, floated his own ship into the hollow shell, closed the gate, and pumped out the water. In time, of course, floating dry docks became specialized structures but with the somewhat absurd weakness that they themselves had occasionally to be dry-docked. They are therefore commonly constructed in sections which can be bolted into a unit strong enough to bear not only the weight of a ship but also the larger stresses caused by wave action, each section being small enough to be dry-docked by the remaining sections and towed by something smaller than the *Queen Elizabeth*.

As it apparently must with all structures, redesign has caught up with the floating dry dock. Stronger and more stable than the conventional units of equal weight, the Navy's new units can lift up to 100,000 tons and are composed of 10 sections, each of which can be towed at 10 knots. A smaller and earlier version demonstrated that it could lift approximately four times its own weight, whereas older types could lift about three times their weight. Ingenious design permits each section to be docked in the others without need of moving the dry dock.

Working positions of maximum efficiency, accuracy of fit, and superiority of execution are assured by the conveyer-fed rotating jigs on the production line in a modern prefabricating plant.

Prescription for Prefabrication

BY WILLIAM W. RAUSCH

WHILE mass-production methods have reduced the cost and improved the quality of most consumers' goods, one of the principal necessities of mankind, a home, has so increased in cost during the past 40 years that ownership has become impossible for the majority of American families. Such families have been forced to live in worn-out or obsolescent houses because the building industry has obstinately maintained antiquated and misfit hand methods such as Noah used when he built his ark.

Prefabrication, in the postwar era, will change this picture. It is a revolution which will make possible the rebirth of home ownership for all families right down to those in the lower income brackets. Brand-new, attractive, healthy modern homes will be available for as little as $2,500, and they can be carried by monthly installments of from $25 to $28. These payments will be less than present comparable rents and will cover local taxes, insurance, and the interest upon the mortgage, while paying off the mortgage debt in 20 years. A clear title to a suitable house lot, which need not be expensive, is the only requirement. With this, no down payment is needed for the house.

What is this miracle? It is simply the application to home manufacture of the precedent set by the automotive industry. Haphazard, uneconomical, hand housebuilding is replaced by efficient mass purchasing of materials and straight-line production upon factory assembly lines. Five major factors are combined to cut cost and improve quality. The process is called "prefabrication," though it might better be called "home manufacture."

Its first elimination is that of the costly sales procedure necessary when John Doe, his brother, and his brother-in-law get together to build, on speculation, one or a half-dozen houses a year. The chances are that their credit is none too good, and so they pay top retail prices to local building supply dealers. The prefabricator, being a manufacturer and of necessity having large capital, buys in mass. With good credit he makes, for example, a single purchase of 10,000,000 feet of lumber as compared to the 5,000-foot order of John Doe. Such large purchases are made directly from the producer of the material, thus eliminating the sales and handling costs of the wholesaler, jobber, and retailer with their pyramiding profits. The producer of the raw material or of equipment makes his shipments in carload lots directly to the conveyer running into the prefabricator's factory. Material costs are reduced as much as 40 per cent.

The second economy is the elimination of weather hazards, a costly item in all construction. The American Federation of Labor has recognized the fact that with ideal conditions under a factory roof, its members receive a larger take-home pay at a lower hourly shop rate. They don't lose time because of rain, snow, or freezing temperatures. Usually this shop rate is about 70 per cent of customary field-labor wage scales. Union officials have also recognized the fact that although less labor will be required on each house, the probabilities are that so many more houses will be built that greater, rather than less, employment will result, as in the automobile industry. They appreciate that ownership of new houses will be brought within reach of their own rank and file.

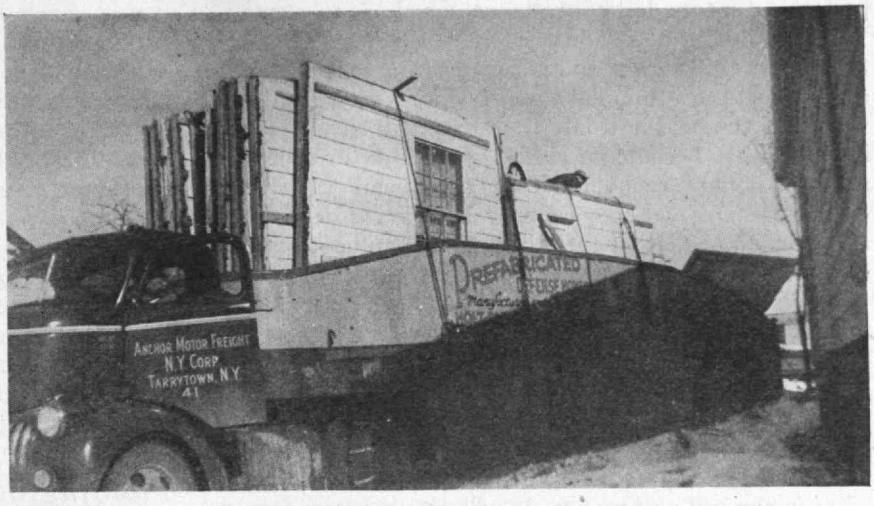
In most customary construction work, waste motion takes a heavy toll in cost. Prefabrication eliminates this. Every minute part of the house is planned, detailed, scheduled, and code marked. All cutting and sawing are done by precision power machinery fed by conveyers, and when each machine is set up, hundreds of duplicate parts are made as one operation. All parts are fashioned far more accurately than is possible with the best of hand cutting. All are prepared in a systematic, timesaving routine with repetitive operations which develop speed and skill. Doors are fitted; windows are hung; cabinets are made; interior trim and exterior finish are fabricated ready for assembly, and are spray painted and baked before application; wall shingles are predipped, thus preserving all sides and edges. All go forward in a true straight-line production, which starts at one end of the factory with the receipt of raw materials and ends upon the shipping platform at the other end of the plant, where large panel sections are power loaded onto trailer trucks.

All time-consuming layouts, measuring, squaring, and plumbing are eliminated by the jig assembly lines. The many parts that compose a house are simply dropped into slots and fastened together. Repetitive operations make this phase almost automatic. Working positions are always at maximum efficiency, since rotating jigs bring all parts of a section down to the man, instead of the man's climbing to the work. Five-room houses are assembled into but 44 panels. Each panel is complete when it leaves the assembly line. All framing, insulation, inside and outside wall surfaces, shingles, doors, windows, hardware, inside and outside trim, cabinets, oak flooring, linoleum, electric wiring, and wallpaper are applied. Plumbing and heating are jig-assembled into large sections for rapid field erection. Monorails, conveyers, and electric hoists eliminate bull labor. It takes but a 40-minute cycle to manufacture a five-room house in this fashion.

The fourth factor is economy in the usage of materials. Houses are not only architecturally designed; they are as carefully engineered as would be a bridge or office

building. All stresses are computed and the structural member of proper size is used — one not too light for its load nor wastefully too large. The haphazard cutting of stock lengths, usual in field construction, is entirely eliminated. The schedules of detailed parts definitely designate the combination of code-marked pieces to be cut from a single stock size, and these combinations are carefully planned to eliminate waste. There is practically no waste, since any small pieces that are left are treated as by-products and made into blocking, cleats, hooks, and so on.

Finally, since all like parts must be interchangeable and go together in the jigs or as panel sections in the field, the quality of material and workmanship must be inherently better. All materials are stored under cover in the factory, not left to swell or twist as when outdoors at the mercy of the weather. Straight, clean, dry lumber, of course, is necessary. Power machinery and assembly-line jigs can be used with utmost precision. Quality products can be mass purchased for less cost than the inferior materials usually associated with speculative building. In other words, better homes are possible at less cost.

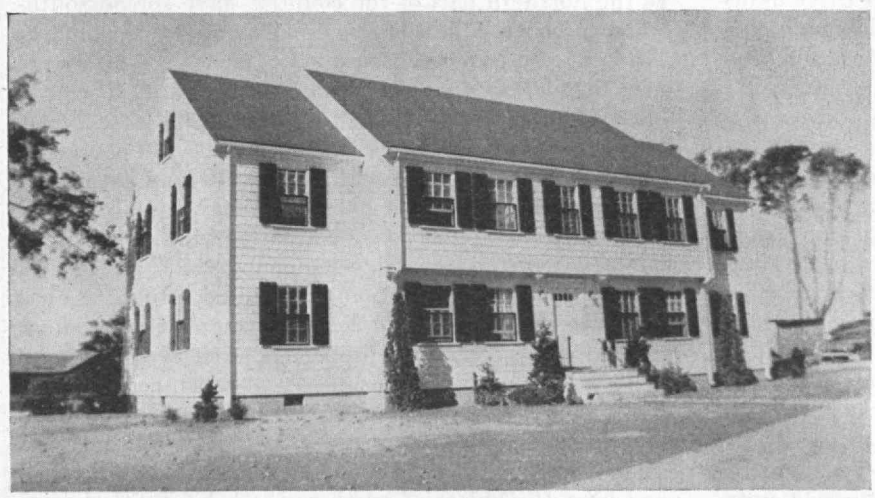


A complete house can be hauled in one load by trailer trucks which are power loaded and which take the dwelling directly to its site.

Prefabrication will probably never become another Detroit, because of the bulk and weight of a house — 12 tons — as compared with the ton and a half of a compact automobile. Prefabrication will be regionalized and factories will be strategically located, with probably a $75 maximum shipping radius per house — that is, about 250 miles. Such shipments will best be handled by trailer trucks, which can be power loaded in the factory and hauled directly to the site. These caravans can haul a complete house in one load.

Upon arrival at the site, the tractor will be detached to go about its other business, while the detached trailer will be left as an easily protected storage bin, directly from which the house can be erected. The foundation, either with or without a cellar, having been prepared a few days in advance, a truck crane, two carpenters, and two helpers can erect the complete house in half a day. It can be completed externally and made tight by nightfall. The next day four carpenters, a plumber with helper, and an electrician put on their finishing touches, while on the third day four painters give the inside and outside the final coat of paint. On the fourth day, the family can move in.

Such houses need not be monotonous in appearance. Houses with one, two, or three bedrooms, and of course a living room, kitchen, and bath, can be arranged with either a full dining room or a dining alcove, providing many combinations differing in ground coverage. They can also have varying silhouettes of wall and roof line. Additions of porches, garages, or garages with porches multiply the many choices without destroying the standardization of panel sections. All the houses may have orientation reversed, their site planning varied, and the color of the blinds or shutters and the roofs changed. Landscaping provides a further effective variation. Communities thus built will be attractive and homogeneous, though differing in detail. They will be far more beautiful than the average mongrel American suburb, where all forms of architecture, with clashing motifs, vintages, and quality, are thrown together in a hodgepodge of so-called individuality. As single units, set anywhere upon any individual's house lot, prefabricated houses will be welcome improvements for any community. Purchased from a large dependable firm, they will have a guarantee which can be trusted as against the often meaningless one given by John Doe.



This four-family dwelling represents the thesis that prefabricators "must concentrate upon the development and production of houses which look like accustomed homes." It is part of a large defense housing project.

Prefabricators, however, must guard against mistakes. They must not treat their product as a gadget or as a novelty, for a home stands for permanence in the heart of a purchaser. They must concentrate upon the development and production of houses which look like accustomed homes, must get away from chicken-coop or summer-camp appearances, and must stop dreaming fantastic monstrosities. They must completely conceal all evidence of sectional construction when the house is completed. Some

prefabricators are doing so; all must who hope to succeed. We have here a new industry which has been aided by the impetus of the war and is now growing man sized. It can parallel the automobile industry in its growth. Many will enter the field but only the fittest will survive since it is bound to become an industry of giants in order to attain maximum economy. It has a tremendous backlog of needed houses, dammed up by 10 years of depression and war, and has a potential market for millions of low-cost homes among the mass of small-income families who thus can at last buy a good new house within their limited means. Since green grass and pride of ownership are the principal differential between a slum and a desirable area, such low-cost houses in suburban communities should never become blighted.

Ownership of individual homes will also cause a rebirth of good citizenship. A family homestead establishes one's roots in the soil of America. It will also promote forced savings, since each installment increases the equity of the owner.

Beloved Scientist

ELIHU THOMSON'S mark is set upon the lives of millions of people in scores of ways so intimate and pervasive that they easily go unrecognized. If all the ramifications of his influence in the day-to-day activities of modern man were consciously gathered for recital, it would be seen that few engineers or scientists of recent generations have left comparable monuments. In his excellent biography,* however, David O. Woodbury, '21, wisely eschews more than a swift suggestion of this aspect of Elihu Thomson's record; he has an even more significant story to tell, for the life of the man who thus greatly swayed and sways the lives of millions is of itself intrinsically a vivid and important document. Much as the influence of his work is subtle and unobtrusive, Thomson's own character was direct and unassuming, to such degree that realization of the full scope of what his interpretation of the search for truth led him to perform is decidedly impressive.

Analyzed in retrospect, Elihu Thomson's life is seen to be of greatest significance in its demonstration that even in the turbulent era of the birth, growth, and consolidation of the electrical industry in this country, a man could play a central role in vigorously competitive industry and at the same time could maintain the qualities of wide-ranging interest and versatile action that too often are regarded as having died with the Renaissance. His early initiative in scientific endeavor, his combination of singleness of purpose with catholicity in means and methods, and his constantly alert and questing curiosity in widely varied fields — all meet the prescription.

His biographer deals understandingly with this most important aspect of the story. In another respect as well, Mr. Woodbury's book is distinguished: This is the placing of Thomson and his work in proper historical relation to the speeding series of events surrounding them. It is done skillfully, by interpolations in the main narrative, which are able both in their comprehensiveness and in the succinctness with which they are composed. Mr. Woodbury is somewhat less fortunate, however, in his occasional interjection of obiter dicta expressing judgments which he may rightly hold but which are not germane to his subject.

From the point of view of human individuality, Elihu Thomson's story is of great meaning because it so powerfully illustrates the precious and vitalizing influence of a mother, a teacher, a book, and a tolerant though preoccupied father in shaping and directing a child's life. This combination in Thomson's life — which Mr. Woodbury discussed in an article for The Review of July, 1943 — is sympathetically recounted in a chapter of the volume, and its influence appears again and again in the story of Thomson's career. That career is so clear a presentation of the old truth about the bent twig and the inclined tree as to make Mr. Woodbury's chapter a valuable admonition to parents, and to schoolmasters.

* *Beloved Scientist: Elihu Thomson, a Guiding Spirit of the Electrical Age* (New York: Whittlesey House, 1944). xiii + 358 pages. $3.50.

Puddingstone

TAILORED overcoats of synthetic rubber are announced as a means of protecting propeller shafts of ocean craft against corrosion by sea water. Shot blasted and given a preliminary coat of cement, the shaft is encased in a sheet of synthetic rubber about 3/16-inch thick. Curing under intense heat for about an hour and a half assures strong adhesion of the coating to the metal. ¶ Sawdust is being used in Canada to supply producer gas as a substitute for gasoline in the operation of internal-combustion engines. ¶ Ultrasound waves are employed to break the oxide layer from the surface of aluminum sheet and provide a close bond between the aluminum and molten tin, in an adaptation of ultrasound to the plating of metals. ¶ Estimates of man-hours required to fabricate a ton of raw steel into finished goods show vividly how much more exacting is production for Mars than for John Citizen. Excluding the aircraft and aircraft parts industry, which consumes a relatively small proportion of steel, the major producers of iron and steel manufactures, of machinery, and of transportation equipment in 1943 expended an average of about 159 man-hours to convert a ton of steel into guns, ships, tanks, machine tools, and other finished products. The comparable 1939 figure was 85 man-hours. As a result of this situation, steel-fabricating industries have expanded far beyond their pre-war relation to the steel-producing industry. ¶ Not all the predators in Norway are Nazis; wolves, formerly confined to the northern part of the country, have spread southward as controls have been broken down by conquest. Farmers who have been stripped of their firearms by the nazi regime are unable to combat the pest. ¶ The 1943 lac crop in India, expected to be small, fell even below estimates. The final figure was but 30,608,160 pounds of Baisaki lac as compared with 85,427,210 pounds in 1942. Late maturing and, in Bengal, a shortage of suitable brood lac are cited in explanation of a situation which gives added importance to the recent development in the United States of a synthetic shellac. The new material, experience has shown, is essentially a duplicate of the natural product, but surpasses it in some properties, such as adhesion to metal as well as wood and subsequent resistance to water. Natural shellac is extremely useful because of its combination of hardness, wear resistance, speedy drying, and solubility in cheap solvents. To duplicate these qualities had been the object of much research here and abroad, which was successfully concluded by the recent synthetic product.

Soil Fertility, Food Source

Efficiency in Mobilizing Reserves of a Dozen Elements in Earth's Crust Is to Be Regarded As a Determinant in World Affairs

By William A. Albrecht

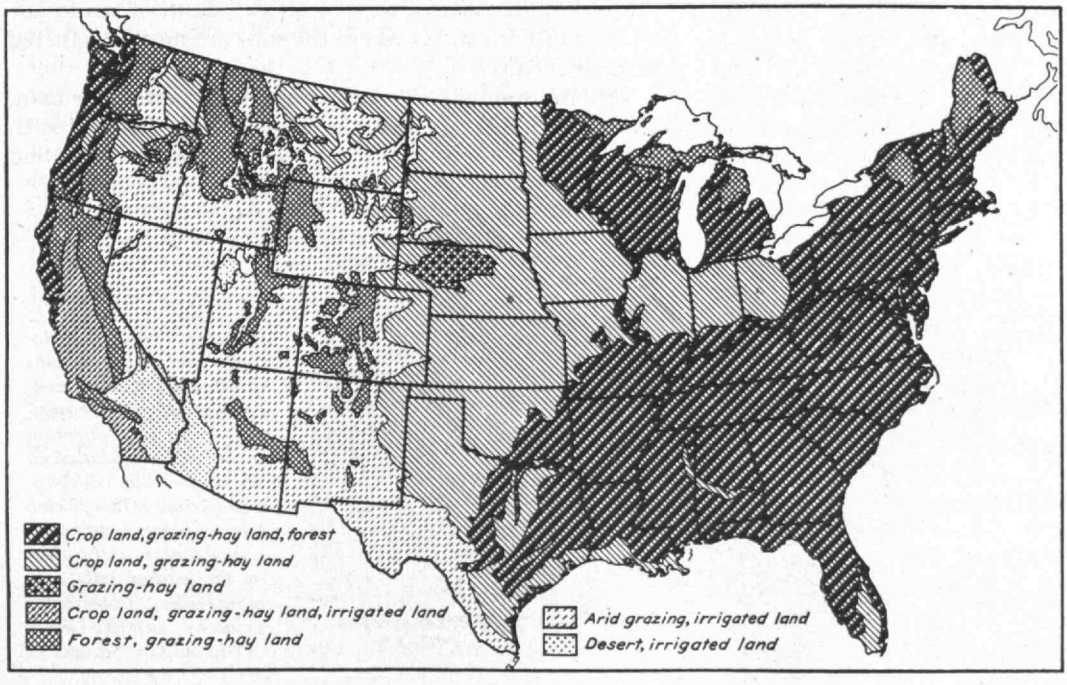
FOOD is fabricated soil fertility. It is food that must win the war and write the peace. Consequently, the questions of who will win the war and how indelibly the peace will be written will be answered by the reserves of soil fertility and the efficiency with which they can be mobilized for both the present and the postconflict eras. National consciousness has recently take notice of the great losses by erosion from the body of the surface soil. We have also begun to give more than passive attention to malnutrition on a national scale. Not yet, however, have we come to recognize soil fertility as the food-producing forces within the soil which reveal national and international patterns of weakness or strength.

What is soil fertility? In simplest words, it is some dozen chemical elements which are being slowly broken out of mineral and rock combinations in the earth's crust and hustled off to the sea. Enjoying a temporary rest stop en route, they are a part of the soil and serve their essential roles in nourishing all the different life forms. They are the soil's contribution — from among a large mass of nonessentials — which empowers the germinating seeds and the growing plants to use sunshine energy in the synthesis of atmospheric elements and of rainfall into the many crops for our support. The atmospheric and rainfall elements are carbon, hydrogen, oxygen, and nitrogen, so common everywhere.

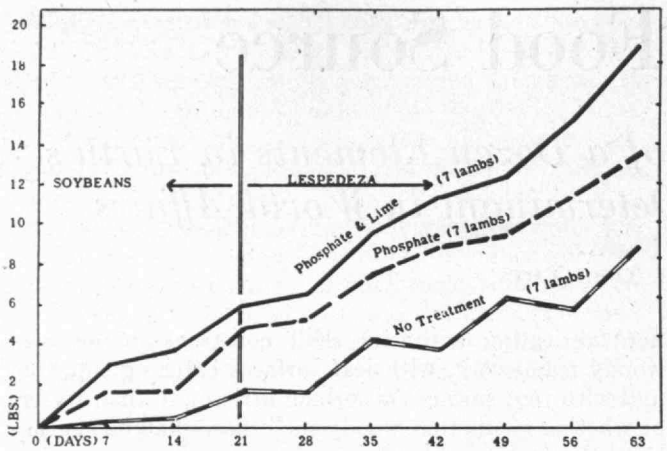
Soil fertility constitutes the 5 per cent that is the plant ash. It is the handful of dust that makes up the corresponding percentage in the human body. Yet it is the controlling force that determines whether Nature in her fabricating activities shall construct merely the woody framework, with leaf surfaces catching sunshine and with root surfaces absorbing little more than water, or whether inside that woody shell there shall be synthesized the innumerable life-sustaining compounds.

Soil fertility determines whether plant foods of only fuel and fattening values, or plant foods capable of body service as complicated as growth and reproduction, shall be grown in a given area. Because the soil accounts for only a small percentage of our bodies, we are not generally aware of the fact that this 5 per cent can predetermine the fabrication of the other 95 per cent into something more than mere fuel.

Realization is now dawning that a global war is premised on a global struggle for soil fertility as food. Historic events in connection with the war have been too readily interpreted in terms of armies and politics and not as actions calculated to mobilize soil fertility. Gafsa, merely a city in North Africa, was rejuvenation for phosphorus-starved German soils. Nauru, a little island speck in the Pacific, is a similar nutritional savior to the Japanese. Hitler's move eastward was a hope looking to the Russian soil-fertility reserves. The hoverings of his *Graf Spee* around Montevideo and his underground workings in Argentina, much more than being maneuverings for political or naval advantage, were designs on that last of the world's rich store of less exploited soil fertility, to be had in the form of corn, wheat, and beef. Some of these historic martial events serve to remind us that "an empty stomach knows no laws" and that man is in no unreal



The regions of major rural land uses as mapped by F. J. Marschner. Though the main natural vegetation types — forest, grassland, and desert shrub — are indicative of major rural land uses, other factors are influential. In the eastern corn belt, originally timber covered, forestry now scarcely exists, because the fertility of the soil and the gentleness of the surface relief favor crop production.



The effect of fertilizer treatment of soils is indicated by this chart. It measures in pounds against days the gain in weight of sheep which were fed equal amounts of hay (and supplements) grown on soils essentially similar but given different fertilizer treatments.

sense an animal that becomes a social and political being only after he has consumed some of the products of the soil.

In view of our youthfulness as an extensive country, our different geographic areas have registered themselves mainly as differences in body comfort, whether hot or cold, wet or dry. Because of the free flow of foods and food constituents by means of cheap transportation, we have not been cognizant of the differences in quality as well as in kinds of foods produced in adjoining districts that differ in soil. We have not yet marked out our country into smaller patchwork districts with distinctive local colorings, as the Old World has in the opinion of visitors from the New World. Limitations in travel, difficulties in food delivery, and all the other restrictions now making us more local will soon emphasize differences and deficiencies according to the soils by which we live.

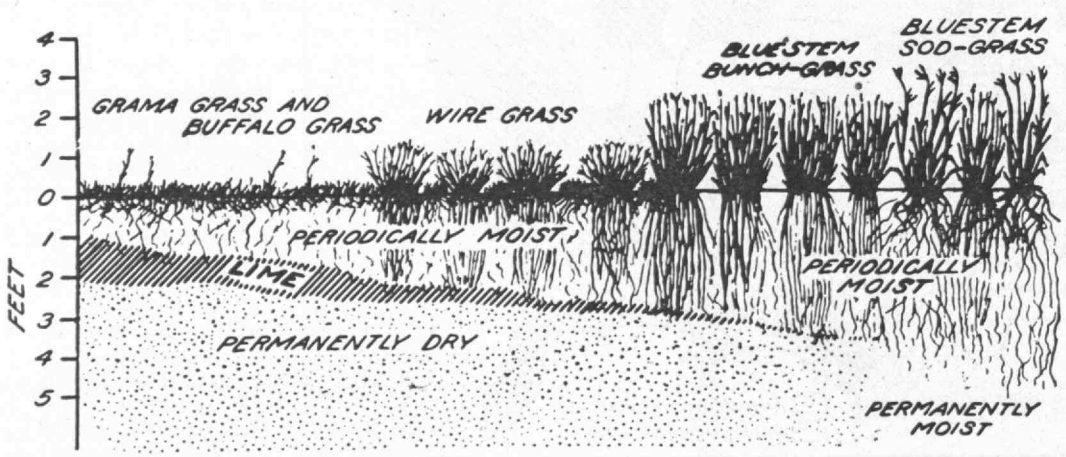
Geographic divisions give us an East and a West in the country as a whole, while a North and a South for the eastern half are commonly interpreted as separations according to differences in modes of livelihood, social customs, or political affiliations. Variations in rainfall and temperature are readily acknowledged. But that these make soils so different in nutritional quality as to control differences in vegetation, animals, and human beings is not so readily granted. That "we are as we eat," and that we eat according to the soil fertility, are truths that will not so generally and readily be accepted. Acceptances are seemingly to come not by deduction but rather through disaster.

Vegetation has been distinguished by names of crop species and by tonnage yields per acre. Plants have not been considered for their chemical composition and nutritive value according to the fertility in the soil producing them. This failure has left us in confusion about crops and has put plant varieties into competition with one another rather than in support of one another. Now that the subject of nutrition is on almost every tongue, we are about ready for the report that vegetation as a deliverer of essential food products of its own synthesis is limited by the soil fertility.

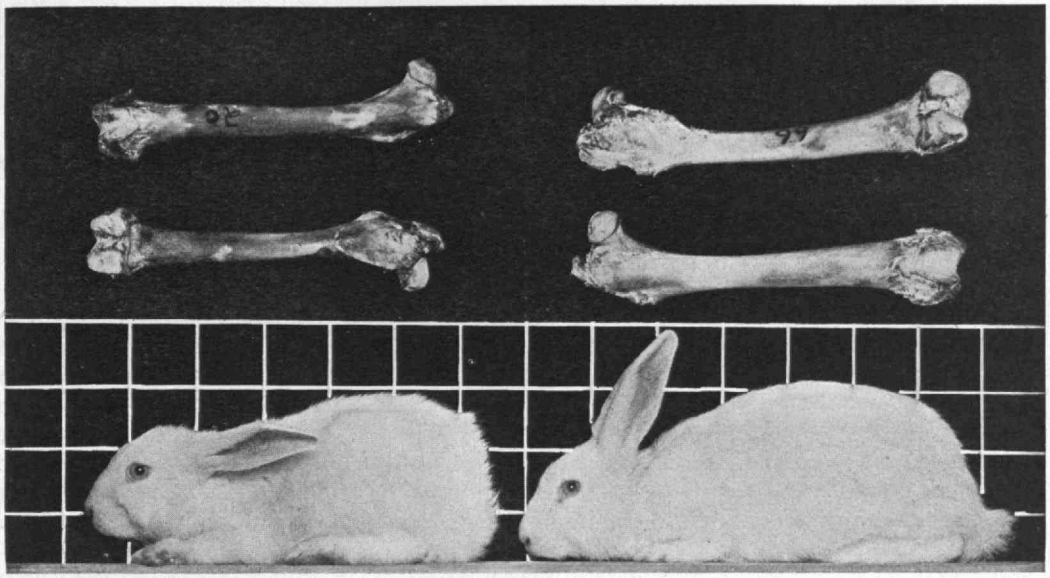
Proteinaceousness and high mineral contents of distinct nutritive values are more common among crops from soils receiving comparatively low rainfall and in less leached areas, as, for example, in the midwestern part of the United States. Hard wheat — so called because of its high protein content, which makes it useful in the milling of the patent flour for light bread — is commonly ascribed to regions having lower annual rainfalls. Soft wheat is similarly ascribed to areas of more abundant rain. The high calcium content, the other liberal mineral reserves, and the pronounced activities of nitrogen within the less leached soil must be accepted as the reasons for this distinction, in view of the fact that experimental trials supplying these fertility items to the soil in regions of high rainfall can result in hard wheat where soft wheat is common.

The proteinaceous vegetation and the synthesis by it of many unknowns which, like proteins, help to remove hidden hungers and encourage fecundity of both man and animal are common in the prairie regions marked by the moderate rainfalls. It is fertility of the soil, rather than low precipitation, which gives the Midwest, or those areas bordering along approximately the 97th meridian, these distinctions: (1) selection of it as a feeding ground by the thundering herds of bison, which multiplied to untold numbers on the buffalo grass; (2) the wheat which, taken as a whole rather than as refined flour, is truly the staff of life; (3) areas where cattle, on unhampered range, nourish themselves so well that they reproduce regularly without being pampered; and (4) the more able-bodied selectees for military service of whom seven are chosen out of ten, in contrast to seven rejected out of ten in one of the southern states where the soils are more exhausted of their fertility.

Protein production, whether by plant, animal, or man, makes demands on the soil-given elements. Body growth among forms of higher life is a matter of soil fertility and



An array of native vegetation from western Kansas (17-inch rainfall) to eastern Kansas (37-inch rainfall). This calls attention to the buffalo's location on lime-laden soils with proteinaceous, mineral-rich but sparse vegetation named for him, rather than on the leached soils with more bulky, carbonaceous growths farther east. (Drawing by Schantz.)



Fertilizer treatments of the soil register their beneficial effects in the plant, but more noticeably in the physiology of the animal as indicated by better weight, wool, fur, bones, or other body products and functions. On the left, the rabbit and the bones record the results of lack of soil treatment, in contrast to the effect of treatment measured by similar gauges on the right.

not one of photosynthesis only. It calls for more than rainfall, fresh air, and sunshine.

Heavier rainfall and forest vegetation characterize the eastern United States, where the soils have been leached of much fertility. Higher temperatures in the southern areas have made more severe the fertility-reducing effects of the rainfall. Consequently, vegetation there is not such an effective synthesizer of proteins. Neither is it a significant provider of calcium, phosphorus, magnesium, or the other eight or more soil-given fetus-building nutrients. Annual production of vegetation per acre is large, particularly in contrast to the sparsity of that on the western prairies. The East's production is highly carbonaceous, however, as the forests, the cotton, and the sugar cane testify. The carbonaceous nature is contributed by air, water, and sunlight more than by the soil. Fuel and fattening values are more prominent than are aids to growth and reproduction.

Here is a basic principle that cannot be disregarded. It has signal value as we face nutritional problems on a national scale. It is, of course, true that soils under higher rainfalls and temperatures still supply some fertility for plant production. Potassium, however, dominates that limited supply, to give prominence to photosynthesis of carbonaceous products. The insufficient provision of calcium and of all the other requisite elements usually associated with calcium does not permit the synthesis, by internal performances in plants, of the proteins and many other compounds of equal nutritive value. The national problem is largely one of mobilizing the calcium and other fertility elements for the growing of protein and not wholly one of redistributing proteins under Federal controls. As the distribution pattern of soil fertility is etched on the map, it delineates the various areas of particular success or particular trouble in nutrition. It coincides also with the regions where the starving plants can be given relief by particular soil treatments.

The more concentrated populations in the United States are in the East and on the soils of lower fertility. To those people, Horace Greeley gave good advice when he said, "Go west, young man." It was well that they trekked to the semihumid Midwest, where the hard wheat grows on the chernozem soils and where both the breadbasket and the meat basket are well laden and carried by the same provider — the soil. It was that move which spelled our recent era of prosperity. In Europe the situation is similar but the direction of travel was reversed and the time period has been longer. Western Europe represents the concentrated populations on soils of lower fertility under heavier rainfall. Peoples there reached over into the pioneer United States for soil fertility, trading for it the goods "made in Germany." More recently the hard-wheat belt on the Russian chernozem soils has been the fertility goal for Hitler's *Drang nach Osten*. Soil fertility is thus a cause of no small import in the world wars.

Life behaviors are more closely linked with soils as the basis of nutrition than is commonly recognized. The depletion of soil calcium through leaching and the almost universal deficiency of soil phosphorus affect animals directly, since their bones are the chief body depositories for these two elements. In the forest, the annual falling of leaves and their subsequent decay, to pass their nutrient elements through the cycle of growth and decay again, are almost a requisite for tree maintenance. Forest soils offer very little fertility and offer it very slowly. Is it any wonder then that dropped antlers and other skeletal forms are eaten by animals to keep calcium and phosphorus in their cycle? Pregnant squirrels gnaw bones in their nests. Deer will select in their browse those trees that have been given fertilizers in preference to those that have not been treated. Pine-tree seedlings along the highway, transplanted from fertilized nursery soils, are eaten by deer while the same species in the adjoining forests go untouched. Wild animals truly "know their medicines," which they take as plants from particular levels of soil fertility.

The distribution of wild animals during pioneer days, the present pattern of domestic animal distribution, and that of concentrations of animal diseases can be visualized as superimpositions on the soil-fertility pattern as it furnishes nutrition. We have been prone to believe that these patterns of animal behaviors conform wholly to climate. We have forgotten that the eastern forest areas gave the Pilgrims only limited game, among which a few turkeys were sufficient to establish a national tradition of Thanksgiving. It was on the fertile prairies of the Midwest, however, that bison were so (*Continued on page 274*)

Penicillin—Progress and Problems

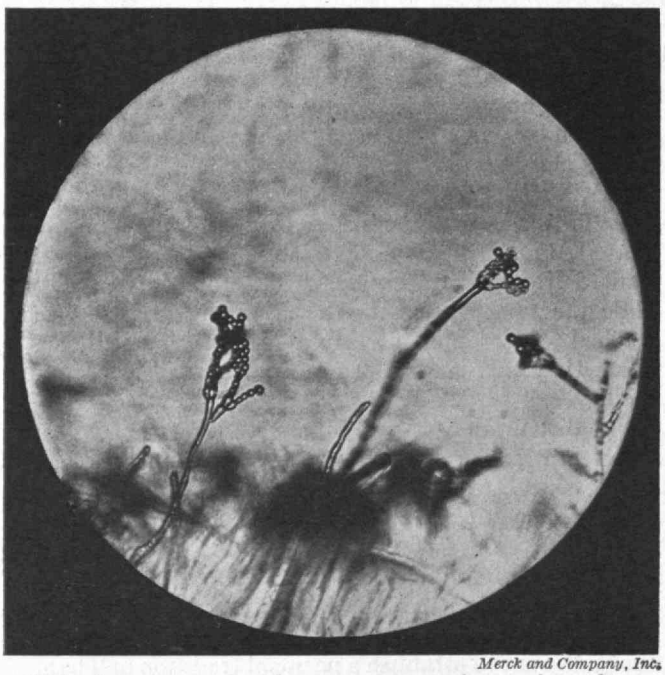
Use of the New Powerful Therapeutic Agent Proceeds Apace As Difficulties of Production Are Overcome

By Rudolf E. Gruber

HEALTH, in time of war, is meaningless unless it means "fitness to fight," whether at the front or at home in the battle of production. For this reason, scientific and technical advances that save lives and maintain physical and mental vigor are as important in the total war effort as the production of arms, ammunition, and other instruments of destruction. And for the same reason, although periods of war always bring heavy emphasis upon devastation, they have in modern times always meant equally heavy emphasis upon efforts to heal and to cure. The present war amply demonstrates this fact, for advances in the healing art have made startling progress during recent years of conflict.

At the battle front and in military and naval hospitals, the use of the sulphonamides, or sulpha drugs, for the saving of lives and the restoration of casualties to fighting fitness is one dramatic example of the advance in this war. Making their appearance some 10 years ago, these drugs by the time of the entry of the United States into the fight had reached sufficient medical recognition to merit inclusion in the materia medica of our armed forces. Their names were household words long before Pearl Harbor.

Coming into general notice at the time of the tragic Cocoanut Grove fire in Boston in November, 1942, the name of a new potent weapon against pathogenic bacteria has, in an even shorter period, attained comparable household familiarity. This weapon — penicillin — whose story Professor Montagu ably summarized in The Review last fall, has continued during recent months to demonstrate amazing and encouraging value in military medicine. The progress which has been made in developing manufacture of the drug and in ascertaining best techniques for the use of it has been swift, in spite of great technical difficulties. The ways by which these have been overcome afford interesting demonstration of the effectiveness of research at work.



Merck and Company, Inc.

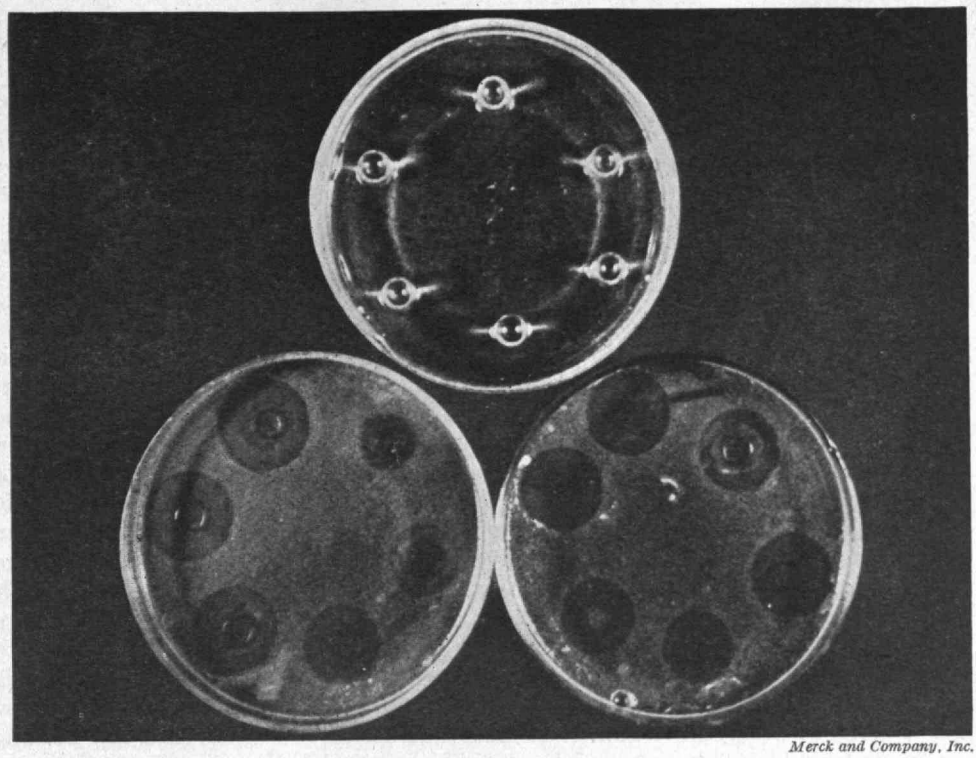
This photomicrograph of the spore apparatus in a surface culture of Penicillium notatum, *magnified about 500 diameters, suggests how the mold got its name.*

Much of the lay publicity which attended the spectacular rise of penicillin was at first premature and misleading, partly for the reason that the actual facts concerning penicillin's progress could not be told under wartime censorship. The resulting state of misinformation has since been fully corrected by Major General Norman T. Kirk's authoritative statement on the relation of penicillin to the war effort and to civilian needs. Dr. Kirk, surgeon general of the United States Army, spoke on December 13, when the American Pharmaceutical Manufacturers' Association presented its 1943 award of distinction to Alexander Fleming for his discovery of penicillin and to Howard W. Florey for his study of the drug as a therapeutic agent. The ceremony was, indeed, international in scope, Dr. Fleming's speech of acceptance being broadcast by short wave from London.

Penicillin is a substance produced by a common mold, *Penicillium notatum*. Evidence of its existence was discovered by Professor Fleming in 1929 at St. Mary's Hospital, London. While examining some culture plates which had become contaminated with air-borne organisms, bacteriologist Fleming noticed that the staphylococcus colonies surrounding a large area of contaminating mold had become transparent, indicating destruction of the bacteria in that area. Fleming's experienced mind reasoned that the fungus exuded a material inimical to the well-being of the micro-organisms. His subsequent experiments proved this hypothesis to be correct. The contaminating fungus organism was identified later by Charles Thom, principal mycologist of the United States Department of Agriculture, as a strain of *P. notatum*, a common mold occurring in fertile soil. (It has been described erroneously as a bread or cheese mold.) Fleming gave the name "penicillin" to the antibacterial broth on which the fungus had grown. The term now is applied to solid concentrates extracted from the broth and will no doubt soon be employed for the pure active principle. (The name "Penicillium," derived from the Latin *penicillus* meaning "brush," is appropriate because the endings of the microscopic branches of the fungus resemble those of a broom or paintbrush.)

Dr. Fleming's suggestion that the culture filtrate might be "an effective antiseptic for application to, or injection into, areas infected with penicillin-sensitive microbes" remained of academic interest for a period of 10 years. Even as late as 1936 at the International Congress

of Microbiology in London, where L. Colebrook presented his epoch-making paper on the chemotherapeutic value of sulphanilamide, a progress report on penicillin aroused no more than casual interest. Not until the eventual wide use of the sulpha drugs had demonstrated the value of chemotherapy in the treatment of bacterial diseases, were the clinical implications of penicillin recognized. As Dr. Fleming mentioned in reviewing the history of the discovery of penicillin during his transatlantic radio broadcast on December 13, it is quite possible that if the potentialities of penicillin had been recognized at an earlier date the sulpha drugs would never have reached their state of prominence in medicine.



Merck and Company, Inc.

The cup assay — one of the microbiologic assay methods for determination of the potency of penicillin, for which no specific chemical test is as yet available. Comparison of the diameters of inhibition zones permits calculation of the strength of solutions of unknown potency.

In 1940 a group of scientists at Oxford — H. W. Florey, E. Chain, E. P. Abraham, N. G. Heatley, and R. Robinson — presented pharmacologic, biochemic, and bacteriologic findings on penicillin, and reported the first in vivo test. (Florey's research work at Oxford had been supported by a Rockefeller Foundation grant since 1939.) In 1941 the same Oxford group reported the first clinical cases. This active interest in the therapeutic possibilities of penicillin induced the Rockefeller Foundation to bring Florey to the United States. After conferences with interested members of the National Research Council and the United States Department of Agriculture, he and his colleague, Dr. Heatley, proceeded to the northern regional research laboratory of the Department of Agriculture at Peoria, Ill., where studies on the culture characteristics of *P. notatum* were initiated at once under the direction of R. D. Coghill.

Dr. Florey subsequently consulted with several American commercial concerns on the matter of their undertaking production developments. The practical aspects of penicillin production had been envisaged earlier, in 1940, by three chemical and pharmaceutical concerns — Merck and Company, Inc., E. R. Squibb and Sons, and Chas. Pfizer and Company, Inc. The potential strategic value of penicillin was recognized by Dr. A. N. Richards, chairman of the Committee on Medical Research of the Office of Scientific Research and Development, and at his urgent request that knowledge on penicillin be advanced as rapidly as possible, these firms co-ordinated their technical and scientific research. Of great assistance was the help given by the Agriculture Department's northern laboratory in furnishing potent strains of the Penicillium organism and in developing a superior medium for the extraction of them for the production of penicillin itself.

The manufacturers' group, through one of its members, established a reciprocal arrangement with investigators in Great Britain, including the original Oxford workers. Penicillin research is being aided by the British and the United States governments, through whose offices the exchange of research data and reference samples is facilitated. Some reference samples have been speeded across the Atlantic by bomber planes to ensure safe delivery of the delicate material.

With the increasing interest of Allied governments in penicillin as a war medicine, other American manufacturing firms were encouraged to enter the production picture. More than a dozen firms built plants or obtained War Production Board approval for the construction of plants. In order to get into production as rapidly as possible, the manufacturers stepped directly from laboratory to plant-scale operations. The chemical engineering problems were particularly difficult because there was no experience in the field to serve as a guide. It is to the resounding credit of the chemical engineers that a task which might ordinarily have taken years was brought to completion in months.

Because of the difficulties involved in producing even limited quantities of the substance, it has been necessary to exercise strict control over distribution of it. The Committee on Medical Research therefore appointed the chairman of the National Research Council's committee on chemotherapeutics and other agents to supervise the distribution of all penicillin stocks available for clinical research by accredited investigators. At present, all penicillin, for whatever purpose used, is allocated in accordance with order no. M-338 of the War Production Board. The bulk of production is reserved, of necessity, for use by the armed forces. Civilian demands will be met as production increases. So rapid has been the development of production capacity for penicillin under the War Production Board's program that in December, Army procurement officials ventured to predict that all military and civilian needs would be met by the middle of this year.

(*Continued on page 279*)

The Elusive Island

How Seamen of Five Nations Were Puzzled in the Delayed Discovery of a Lonely Lump of Antarctic Rock and Ice

By Willy Ley

THE "World Almanac" lists under Norway's possessions the following islands: Spitsbergen, an island group in the Arctic Ocean totaling about 24,300 square miles, with an original population of, 2700 (now evacuated); Jan Mayen, an island some 300 miles north of Iceland, of 144 square miles, and originally with a meteorological station; Peter I Island in the Antarctic, 94 square miles and uninhabited; and Bouvet Island, of 22 square miles and uninhabited, lying in the south Atlantic, a few degrees north of the Antarctic Ocean.

Of all these islands — and of all the similar island possessions of other nations — Bouvet Island is by far the most interesting. The island itself — small, for the greater part covered with ice, and virtually unscalable and useless — does not hold anything of special value. The unusual and amusing story is how this dot was placed on the map after a century of doubt and misunderstandings and how it came to be listed as a possession of Norway.

That story began on New Year's Day, 1739, the day when the island was first seen, by the Frenchman Lozier Bouvet and his crew. Bouvet had been sent to the south Atlantic by the Compagnie des Indes. Two ships, *L'Aigle* and *La Marie*, had been placed at his disposal by the company, which hoped for some undiscovered land in the South.

At that time most people believed the existence of a large Southern Continent, a "terra australis incognita," as it was called. It had only to be discovered, and Lozier Bouvet had been sent out to find it. Instead he found the island which now bears his name. We now know that it is roughly pentagonal in shape, extending about five miles from east to west and not quite four and a half miles from north to south. Its geographical position is 54 degrees 26 minutes south and 3 degrees 24 minutes east. Bouvet thought it to be under latitude 54 degrees south and extending between four and five degrees east.

But Bouvet did not think that it was an island. He felt sure that he had at last reached the unknown Southland everybody at home was talking about and that the mountain he saw was a mountain on a cape or promontory of that continent. Consequently, he called it a cape, "Cap de la Circoncision," in honor of the religious festival of the day. His two vessels were about 10 miles from the island, but since the wind stood offshore they could not approach. The dense fog which began to settle down soon after the discovery and which lasted for more than two days did not help to make life any happier for the sailors, who began to show the first signs of scurvy. After both ships had almost collided in the fog, Bouvet decided not to attempt a landing and sailed on to the northeast to look for more capes of the Southland.

Needless to say, he did not find any, and at last he returned to France and delivered his meager report. Strangely enough, nobody tried to find the hinterland of the Cap de la Circoncision for a generation. At least there is no record of any search.

It was the great James Cook who, leaving the Cape of Good Hope on November 22, 1772, in the *Resolution*, accompanied by the *Adventure*, was the first after Bouvet's time to search for Bouvet's land. Although the weather was quite clear and many icebergs were within view (some of them larger than the actual Bouvet Island), no land was sighted. The two vessels passed close to the location given by Bouvet for his "cape," but only water was found. It is a matter of record that some of the officers thought to have sighted land. However, when they passed the same spot two years later on their homeward voyage and saw nothing, they admitted that they must have erred.

After sailing almost directly over the spot where Bouvet's cape ought to be (on December 11, 1773), the ships encountered immense ice fields which forced them to return. They arrived in the vicinity of Bouvet Island again on December 29, again without seeing land. A number of days later they found themselves about a hundred miles south of the "cape," which fact was proof that it was not a cape but an island — provided that it existed at all.

James Cook returned from Southern waters in 1775, more than two years after his first quest for Bouvet's land. He decided to try once more and spent five days sailing around the supposed geographical position. Once he believed he saw land, but it was only heavy fog on the water which had deceived him. In his final report he concluded:

> Having now run over the place where the land was supposed to lie, without seeing the least signs of any, it was no longer to be doubted but that ice-islands had deceived us as well as Mr. Bouvet. The wind by this time having veered to the North, and increased to a perfect storm, attended as usual with snow and sleet, we handed the top-sails and hauled up E.N.E. under the courses. During the night the wind abated, and veered to N.W., which enabled us to steer more to the North, having no business farther South.

It then seemed that Bouvet Island had been a mistake. Cap de la Circoncision disappeared from the maps, and though some geographers may have been disappointed, the majority of them were pleased to have a doubtful point cleared up. It was then that the complications really began.

More than 30 years later the English captain, James Lindsay, returned from a journey to antarctic waters, made in the ship *Swan*, which was owned by the London sailing and whaling firm of Enderby Brothers. It had been part of the instructions to all the captains of this firm to look for Bouvet's cape if they should enter these waters. Captain Lindsay now reported that he had actually found it on October 6, 1808. It was not a cape, he said, but a small island. The description and the dimensions

given leave no doubt that Lindsay really saw Bouvet Island. The position he assigned to it is almost precisely one degree east of the true position, a small error which shows that he handled his inadequate equipment exceptionally well. He had tried to land but had found the attempts to be so dangerous that he gave up.

The next to reach Bouvet Island was Benjamin Morrell, captain of the American sealer *Wasp*. He arrived there on December 6, 1822. Though his description also fits Bouvet Island very well, he made a slightly larger error in determining its position, placing it about two and a half degrees east of the actual position. Morrell had a boat sail round the island to look for a landing place, but his men were not successful. Captain Morrell must have heard of Lindsay's discovery, because he speaks of "Bouvette's Island, so called from being first seen by that navigator in October, *1808*." That date proves that Morrell had Lindsay in mind, although he used (and misspelled) the name of the original French discoverer.

Things had then progressed to a point where it seemed certain that a small island existed at about latitude 54 degrees 30 minutes south, somewhere between longitude four and six degrees east. The main confusion arose when another Enderby Brothers skipper, Captain George Norris of the *Sprightly*, got there on December 10, 1825. Norris returned with reports of *two* islands, which he named "Liverpool Island" and "Thompson Island." He said that he had tried to land on both, but that Liverpool Island proved to be inaccessible. He added, however, that his men managed to get ashore on Thompson Island. In addition to the two islands, the captain reported a number of rocks in the vicinity. He called them the "Chimneys." Neither of the two islands — nor the rocks — coincided in position with any of the other reports. Rarely did a logbook entry cause so much search and waste of time as did that of Captain Norris.

It was an anticlimax to Norris' discovery that another British captain, the next to look for Bouvet Island, returned saying that nothing could be found. That man was none other than James Clark Ross, sent to Southern waters by the British Government following a request of the British Association for the Advancement of Science and the Royal Geographical Society, in quest for data on terrestrial magnetism in the Southern Hemisphere. This was the famous expedition of the *Erebus* and the *Terror* in the early 1840's, which returned with a great wealth of new knowledge. The true geographical position of Bouvet Island, however, was not among it. Ross had looked for the island and had failed to find it. When, after his return to England, he was made acquainted with the logbooks of Captains Lindsay and Norris, he replied that he had no right to deny the existence of the islands but that he had the right to say they could not be located in the positions assigned to them by Enderby Brothers captains.

The lords of the admiralty then had the feeling that things were not quite as they ought to be. First, a Frenchman discovers land somewhere, but Cook as well as Tobias Furneaux, the captain of Cook's second vessel, fails to find it. Then sealers come home and report not one but several islands. Meanwhile a man like Ross happens to sail the same section of the oceans and reports on his return that there is no island, not even the original one of the Frenchman.

The lords of the admiralty felt strongly that a British captain, even if only a sealer, should be able to tell his position on the high seas and should, furthermore, be able to ascertain whether he is perched on dry land or floating on water. Since a few more magnetic observations had to be made anyway, they decided to send another vessel out to do a sweeping job, make magnetic observations, watch ocean currents, and, incidentally, *find* the island — or islands, whatever it was. Thus Admiral Josceline Percy, then commander in chief at the Cape of Good Hope, was ordered to assign a vessel to do these tasks. He chose the *Pagoda*, a small sailing vessel; manned it with volunteers from his own flagship, the *Winchester;* and put Lieutenant T. E. L. Moore, a former mate in Ross's *Terror*, in command. Moore returned to say that neither the islands nor the Chimneys were to be found, but that on March 7, 1844, he had found a single rock, fairly far from any of the positions given by the others, and named it "Pagoda Rock."

Pagoda Rock has never been seen since.

The lords of the admiralty gave up.

Nor did anybody else look for the island until American sealers brought new reports. It is true that the reports were very meager, but this much seems certain: that Captain Williams of the schooner *Golden West* landed on Bouvet Island in 1878; that Captain Church of the *Delia Church* saw the island in 1882; (*Continued on page 294*)

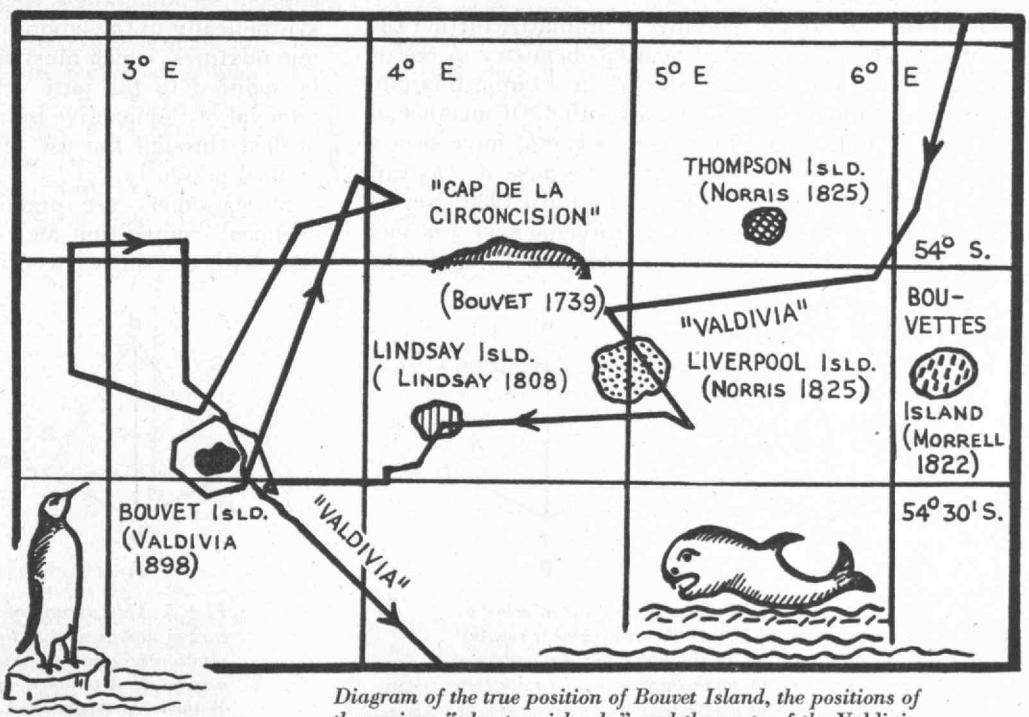


Diagram of the true position of Bouvet Island, the positions of the various "phantom islands," and the route of the Valdivia

Chemistry in Three Dimensions

The Stereoisomers Demonstrate Several Important Truths About Man and Nature, and Mark the Speed of Research As Well

By Frederic W. Nordsiek

VIVID proof of man's essential impotence to reproduce the subtle chemistry of nature lies in a phenomenon laboring under the ponderous if sonorous name of "stereoisomerism." Stereoisomerism, furthermore, shows the constancy of inherited characteristics among plants and animals in aspects penetrating far beyond the superficiality of body size, form, and color. Finally, it demonstrates a fundamental kinship of all living organisms, which establishes beyond controversion the common evolutionary origin of everything alive today. This discussion purposes, after laying the requisite background, to support these three statements.

Only recently has stereoisomerism gained sufficient technological importance to focus attention upon it. In the 1930's it merited treatments covering at the most a few pages in the editions of standard organic chemistry textbooks then in use. A student at that time received the impression that it was an interesting facet of the atomic theory but one quite remote from practical application. Hence he relegated it to the same mental category as damped periodic motion at right angles, which made such a pretty demonstration to alleviate the long hours of freshman physics but which even the lecturer confessed to be of no real use whatsoever. However, if this same student after graduation engaged in work with foods or pharmaceuticals, or in any other field involving application of physiological chemistry, he would before a decade had elapsed have found himself dealing with stereoisomers as workaday commonplaces.

To illustrate and, incidentally, to dramatize further the breathless advance of nutritional biochemistry in recent years, take the story of a member of the vitamin B family called "pantothenic acid." Our hypothetical member of the class of 1935 would most assuredly not have seen a textbook reference to this vitamin because it was not announced in the periodical literature until 1939. Nevertheless, by the following year pantothenic acid was successfully synthesized and today is commercially available, being customarily supplied as the calcium salt, calcium pantothenate. If our budding biochemist were faced with the problem of fortifying a product with pantothenic acid, he would find that the calcium salt is available in two forms. One of these is distinguished by a prefix to the vitamin component of the compound's name, comprising a *d* followed by an *l* followed by a hyphen; thus — calcium *dl*-pantothenate, the "racemic" form. The other is labeled calcium *d*-pantothenate and is called the "dextro," or more often simply the *d*, form. Furthermore, he would find that while the latter form has full vitamin activity, the racemic form is a mixture of the active type with an equal quantity of calcium *l*-pantothenate, the *l* standing for levo, which has no vitamin effect whatsoever. Therefore, if the racemic form be employed, double the indicated quantity is required. However, since racemic calcium pantothenate now costs 11¼ cents a gram and the fully active *d* form costs 25 cents a gram, it actually is less expensive to use the double amount of the racemic mixture.

Calcium *d*-pantothenate and calcium *l*-pantothenate are stereoisomers. Before proceeding with a brief review of those principles of organic chemistry necessary to a full understanding of this phenomenon, let us recognize that the example just summarized has highlighted two fundamental and fascinating aspects of stereoisomerism: First, isomers of this type, while closely related and indistinguishable chemically, differ wholly in their physiological effects; second, when such compounds are prepared synthetically in the laboratory, they are inevitably racemic mixtures, which must secondarily and at added cost be reduced to the pure active form by destruction or removal of the inactive isomer. This reduction is accomplished through the use of methods which will be explained presently.

Stereoisomers are organic compounds of identical chemical composition and identical molecular constitution, with the single exception that atoms tied to one or

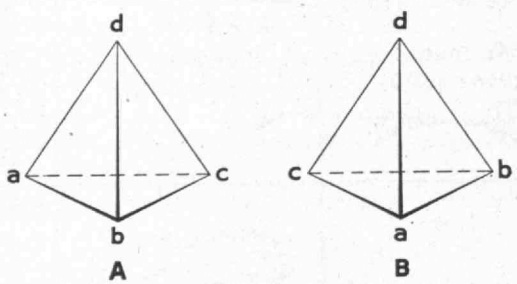


Fig. 1. Four different atoms or radicals attached to a carbon atom, shown as the apexes of a regular tetrahedron. A *and* B *represent the same stereoisomer because, although they appear dissimilar, only rotation about a vertical axis is necessary to align corresponding apexes.*

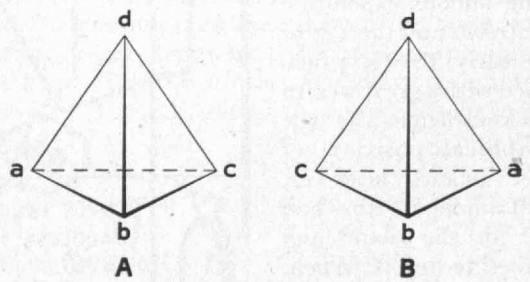
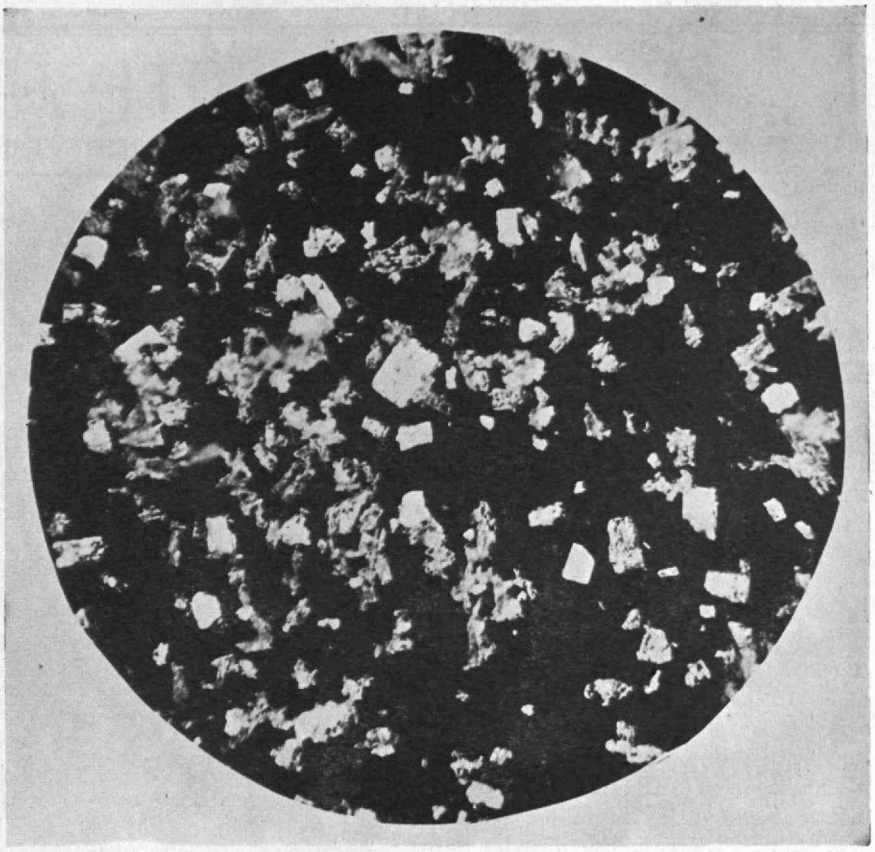


Fig. 2. This arrangement shows the asymmetric carbon atom essential to stereoisomerism; here no rotation around any axis will align corresponding apexes. If A *is taken as representing a* d *isomer,* B *then represents the* l *isomer of the same compound.*

more of the carbon atoms within the molecule differ in their spatial arrangement. Atoms of the element carbon possess in virtually all cases four valences, valencies, affinities — whatever we choose to call the bonds whereby atoms are joined together into molecules to make chemical compounds. Presumably these affinities of the carbon atom stand equidistant from each other, which fact means that if they be represented as lines meeting at a common point, each of these lines will be at an angle of 109 degrees 28 minutes from each of the others. Such a concept is impossible to show on the printed page, because it does not lend itself to perspective rendering. A clearer presentation is to show the valences of carbon atoms as the four apexes of a regular tetrahedron — a solid having four plane faces, each an equilateral triangle.

In Fig. 1, the valences of a carbon atom so represented have been distinguished by the first four letters of the alphabet to indicate that a different atom or radical is attached to each. A radical, it will be recalled, is a group of atoms which during chemical reactions stay together and behave as a single atom — for example, the sulphate radical SO_4. Two presumably different arrangements have been shown in Fig. 1. However, through merely rotating *B* on a vertical axis running through *d* till *a* assumes the position held by this same apex in *A*, the two sketches of this figure are made to appear identical, showing that there is in fact no true difference in the arrangement of attached atoms in these two instances.



E. R. Squibb and Sons

Crystals of vitamin C, as the microscope sees them. In terms of stereoisomerism, this vitamin is l*-ascorbic acid.*

In contrast, no rotation around any of the axes in the two arrangements shown in Fig. 2, will make possible an alignment of corresponding apexes. This situation represents the case of the asymmetric carbon atom which gives rise to stereoisomerism; if *A* in Fig. 2 represents the *d* form, then *B* depicts the *l* isomer of the same compound. Asymmetry in this sense may be elucidated by a final illustration, Fig. 3. Here the affinities *a*, *b*, and *d*, again representing dissimilar atoms or radicals attached to the carbon atom, have been depicted as before, but in place of *c* an additional *b* has been substituted. The most widely differing arrangements conceivable have been shown in *A* and *B*, yet it is immediately apparent that once again but a simple rotation around the vertical axis is required to make them look exactly the same, thus demonstrating the actual uniformity of these two apparently dissimilar dispositions. Thus the fact is established that for a carbon atom to possess the asymmetry requisite to stereoisomerism, it must be attached to four *different* atoms or radicals.

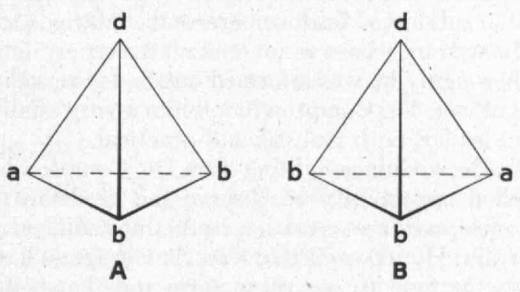


Fig. 3. This shows that the asymmetry essential to stereoisomerism cannot exist where the carbon atom holds less than four different atoms or radicals. Here three different attachments are arranged in the most widely dissimilar ways possible, yet only rotation around the vertical axis is needed to bring about alignment.

It should be pointed out that stereoisomers represent mirror images of one another. Thus if sketch *B* of Fig. 2 is rotated until apex *a* occupies the same right-hand position it does in *A* of this figure, and if it is then held up to a mirror while *A* is regarded directly, the two will appear identical. This same demonstration may more easily be performed with the two hands. Hold the right hand before a mirror with the palm turned toward the reflecting surface. Compare its image thus viewed with the palm aspect of the left hand viewed directly, and the two members will appear to have the same spatial arrangement of the fingers. This useful analogy between the human hand and stereoisomers will serve us again later to clarify one of the methods used to separate isomers.

The immortal Pasteur is thought of primarily as a microbiologist, whose researches established the modern science of bacteriology and thus laid the cornerstone of present-day public-health activities. Louis Pasteur, however, was first of all a chemist, whose work in this field, like his bacteriological studies, was performed primarily for the benefit of the important wine-producing industries of his country. He discovered stereoisomerism in tartaric acid, the predominant acid of the (*Continued on page 284*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

"Out of Town"

WHEN the President's Office informs visitors that Dr. Compton is "out of town," the casual assumption is that he is probably in New York or Washington, but not in Australia or the jungles of New Guinea as he was for several weeks in December and January.

President Compton went to the Pacific war zone in his official capacity as chief of the office of field service, Office of Scientific Research and Development, to study the use under active service conditions of various technical devices developed for the Army and Navy. His whereabouts, for obvious reasons, is usually known to only his closest associates, and his presence in Australia was restricted information until Raymond Clapper, Washington correspondent who later lost his life in the Marshall Islands invasion, reported meeting Dr. Compton in Australia.

In an inspection trip on which he traveled 28,000 miles by air, Dr. Compton, chief of the office of field service officially, was president of M.I.T. to hundreds of Institute men he met in remote stations in various parts of the Central and Southwest Pacific war zone. Almost without exception they asked for news of the Institute and their friends of student days at Technology. He found M.I.T. men in high places in the Army and Navy and in very important technical posts in war service. Among them was Lieutenant General George C. Kenney, '11, commander of air operations in the Southwest Pacific and head of the Fifth Air Force. At one stop in Australia, plans were made for an all-Technology dinner, but lack of time and the pressure of war duties made it necessary to forego what would have been a unique event in alumni gatherings.

U.S. Army Signal Corps

On a recent inspection tour of Army installations in the Southwest Pacific area, President Compton was photographed in a transport plane. On the table is the model of an outrigger canoe which natives presented to him. Dr. Compton made the tour in his capacity as chief of the office of field service, Office of Scientific Research and Development.

Dr. Compton's itinerary and much of what he saw must necessarily remain confidential for the present, but it may be reported that upon arrival in Australia he went to the headquarters of General Douglas MacArthur for the first of a series of conferences on the effective use of scientific devices on the various Pacific battle fronts. It was reassuring to hear that Dr. Compton found great satisfaction in what he saw. He was very much impressed by the high morale of our Army and Navy forces in the Pacific. The officers responsible for directing operations against Japan in the Pacific, Dr. Compton said, know exactly what they want to do, how they intend to do it, and how the war is to be won. He added that the earlier handicap of lack of transportation over the vast sea and land distances of the Pacific is rapidly being overcome.

From lieutenants to colonels, all General MacArthur's officers admire him and trust him implicitly, Dr. Compton reported. They are convinced that he is the man for the "Pacific job." Dr. Compton was told that General MacArthur's slogan in dealing with his officers is "either believe in them or relieve them." After an intensive study of war operations and an investigation of the utilization of scientific aids in various active service operations, Dr. Compton submitted his formal recommendations to General MacArthur, whose comments on the report indicated how thoroughly he was informed on the various complex phases of war. Dr. Compton found him a very affable and forceful leader, both realistic and practical.

In the New Guinea fighting zone Dr. Compton had an unexcelled opportunity to observe the hardships under which our forces are operating in the most difficult tropical terrain. He reported that excellent progress has been made in the fight to control malaria and that persistent and effective countermeasures have reduced the malaria rate to 26 cases per thousand per year. Though early observations led to the belief that the Japanese were more nearly immune to malaria than were our troops, it has been discovered, he found, that the reverse is true. The greater resistance of our men is attributed chiefly to the

high nutritional standard maintained in the diet of the Army and Navy forces.

Australian scientists and industrialists are making effective contributions to the war, Dr. Compton reported. He had opportunities to visit the scientific and technical agencies comparable to the National Research Council and the Office of Scientific Research and Development in this country and was much impressed by their projects. He spoke, too, of the fine spirit of co-operation and free exchange of technical information among scientists of the United Nations.

Appointed

THE appointment of Arthur L. Townsend, '13, as acting director of the Lowell Institute School, has been announced by Ralph Lowell, sole trustee of the school. Professor Townsend, who has long been a member of the faculty of the Department of Mechanical Engineering, will direct the Lowell Institute School in the absence, because of ill-health, of Professor Charles F. Park, '92, who has been director of the school since its establishment in 1903.

The Lowell Institute School, which is conducted under the auspices of M.I.T., offers free courses in applied science for men working in industry. The classes of the school are held in the evening at Technology and nearly all members of its staff are drawn from Technology's Faculty. Professor Townsend has been a member of the Lowell Institute School staff for many years and is thoroughly familiar with its educational objectives and curriculum.

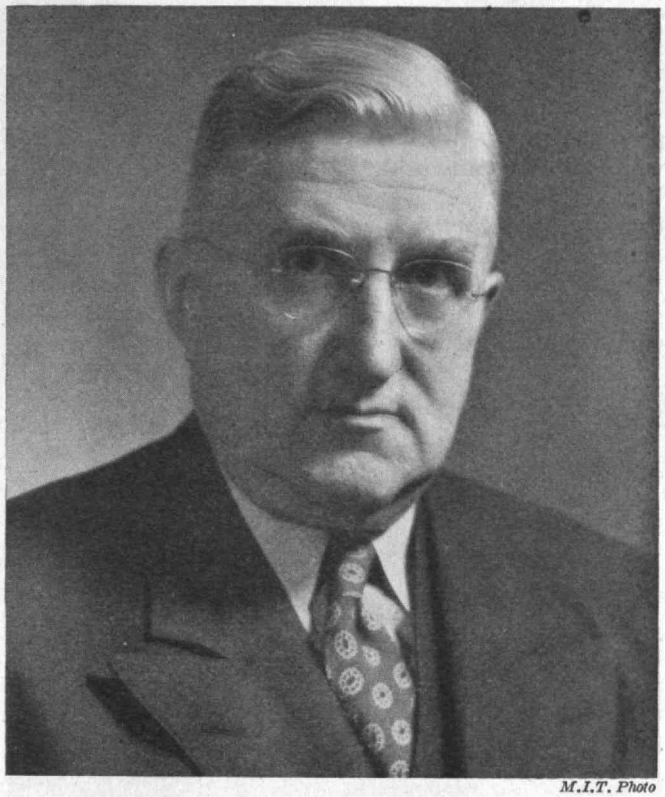
He is a native of Boston, the son of Mrs. Walter L. Townsend and the late Mr. Townsend, former Boston hotel manager. Following his graduation he joined the staff of the Massachusetts Bonding and Insurance Company as chief inspector for New England. Later he became supervising engineer of the company.

He joined Technology's staff as an instructor in 1919, was promoted to the rank of assistant professor in 1929, and to that of associate professor in 1937. He will continue his duties in the Department of Mechanical Engineering where, in addition to instruction in machine design, he is Department placement officer.

Professor Townsend is a former vice-president of the Alumni Association and has been active on many important alumni committees. He is a member of the Society of Automotive Engineers, the American Society for Metals, the American Association for the Advancement of Science, and the Society for the Promotion of Engineering Education, of which he is a former chairman of the mechanical engineering division.

In Council

MEETING at the Smith House in Cambridge on the last Monday in January, for its 236th session, the Alumni Council acted on a number of reports, heard Lamar Field, 2-44, describe a phase of undergraduate activities, and was given an illuminating discussion of the progress and present situation of the national rubber program by Bradley Dewey, '09, rubber director for the War Production Board. Best evidence of the great interest in the address was the fact that this meeting of the Council came close to setting a record for attendance,



M.I.T. Photo

Arthur L. Townsend, '13, Associate Professor of Mechanical Engineering at the Institute, who has been appointed acting director of the Lowell Institute School

107 members and guests being present. Francis J. Chesterman, '05, President of the Alumni Association, was chairman of the evening.

As chairman of the senior week committee for his Class, Mr. Field attended the meeting as the first speaker under the Council's new policy of inviting an undergraduate to speak on student activities at each meeting. Describing the problems which his committee had encountered in arranging traditional festivities under wartime conditions, Mr. Field struck a reminiscent note for many of the members present.

Business of the meeting included reports of various officers and committees, including a summary of Alumni Fund affairs by the Fund Director, Henry B. Kane, '24. Mr. Kane reported that as of January 31, with two months to go in the 1943–1944 Fund, 150 more contributors than last year's total and over $5,000 more in contributions had been recorded, the statistics being: contributors, 8,682; contributions, $107,191.24; average, $12.37.

Resolutions in memory of Julien W. Vose, '83, for many years a member of the Council and a regular attendant at its meetings, were presented by a committee consisting of James A. Cushman, '03, chairman, Henry K. Spencer, '09, and Donald P. Severance, '38. A rising silent vote accepted the resolutions. Mr. Vose had served the Council as representative of his Class.

Upon the conclusion of business, President Chesterman turned the meeting over to Rubber Director Dewey, who with the use of numerous slides indicating the size and complexity of synthetic rubber plant installations being made under the nation's rubber program, described the situation in thoroughgoing fashion, and, moreover, was very generous in answering questions.

In the High Command

NEARLY 100 Alumni of the Institute are sharing in the direction of the second World War through their positions in the high command of the armies of the United Nations and in the Navy and Coast Guard of the United States. Sixty-six Alumni are general officers in our own nation's Army, one has similar status in the Canadian Army, and another in the army of the Chinese Republic. Twenty Alumni hold comparable rank in the United States Navy, one in the United States Coast Guard. The list, as of late February, follows:

FOR PRESIDENT

. . . of the Alumni Association of the M.I.T., the National Nominating Committee has named this year Raymond Stevens, '17, of Melrose, Mass., Vice-president of Arthur D. Little, Inc., consulting chemists and engineers, Cambridge. Permanent Secretary of his Class, Mr. Stevens has long been active in alumni and Institute affairs, as vice-president of the Alumni Association from 1938 to 1940, as chairman of the Friends of the Library, as member of the Alumni Council since 1924, as member of the Corporation Visiting Committee for the Department of Business and Engineering Administration, and in other capacities. After his graduation from Course XV, he served as second lieutenant, Chemical Warfare Serviee, in 1918, and thereafter was associated with the Isko Company in Chicago, manufacturers of electrical refrigerating machines. He joined the Arthur D. Little organization in 1920. His directorships include the Star Brass Manufacturing Company, Boston, and the Home Savings Bank, Boston. In 1942 he served as consultant to the War Production Board. He is a member of the executive committee of the division of engineering and industrial research, National Research Council, and in 1942–1943 was chairman of the council's committee on war use of research facilities. He is a member of the council of applied physics of the American Institute of Physics, the American Institute of Chemical Engineers, the Institute of Food Technologists, the American Chemical Society, and various other professional and scientific organizations. Editor of Industrial Research, *issued by the National Resources Planning Board in 1939, Mr. Stevens has published numerous papers on industrial research.*

United States Army

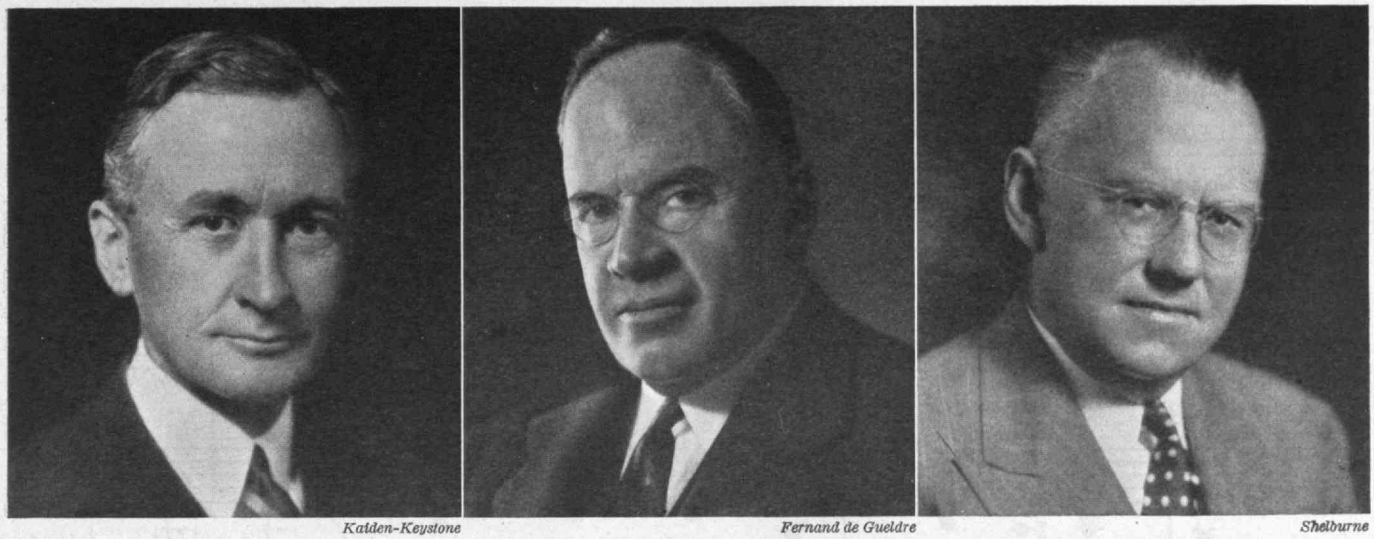
1907: Lieutenant General Lloyd R. Fredendall, Brigadier General Stuart C. Godfrey
1909: Major General Kenneth T. Blood
1910: Brigadier General William R. Nichols
1911: Lieutenant General George C. Kenney, Major General Sidney P. Spalding, Brigadier General Lawrence B. Weeks
1912: Brigadier General Edward Montgomery
1913: Major General Fulton Q. C. Gardner, Major General Albert M. Jones (prisoner of war)
1914: Brigadier General Alden H. Waitt, Brigadier General John E. Wood
1915: Brigadier General Alexander G. Gillespie
1916: Brigadier General Walter P. Boatwright, Brigadier General Henry W. Harms, Brigadier General James F. C. Hyde
1917: Brigadier General Leslie R. Groves, Jr., Brigadier General Albert F. Hegenberger, Brigadier General Allen F. Kingman, Brigadier General Forrest E. Williford
1920: Brigadier General Aaron Bradshaw, Jr., Brigadier General Robert H. van Volkenburgh, Brigadier General Lyman P. Whitten
1921: Brigadier General Harvey C. Allen, Brigadier General James E. Baylies, Brigadier General Franklin O. Carroll, Major General Richard Donovan, Brigadier General Edgar Erskine Hume, Brigadier General Henry Hutchings, Jr., Major General George F. Lull, Brigadier General Raymond G. Moses, Major General Maxwell Murray, Brigadier General James B. Newman, Jr., Brigadier General Daniel Noce, Brigadier General Alfred B. Quinton, Jr., Brigadier General Stanley L. Scott, Brigadier General Don G. Shingler, Brigadier General Ludson D. Worsham
1922: Brigadier General Albert J. Browning, Brigadier General Wilbur E. Dunkelberg, Brigadier General William F. Heavey, Brigadier General William M. Hoge, Brigadier General Clinton W. Howard, Brigadier General Dwight F. Johns, Major General Wilhelm D. Styer
1923: Brigadier General Raphael S. Chavin, Brigadier General John K. Christmas, Brigadier General John W. Coffey, Major General William E. R. Covell, Brigadier General John H. Hinds, Brigadier General Russell E. Randall, Brigadier General Stewart E. Reimel, Brigadier General Hermon F. Safford
1924: Major General James H. Doolittle, Major General Stephen G. Henry, Brigadier General Frank J. McSherry, Brigadier General Gordon M. Wells
1925: Brigadier General Jonathan L. Holman, Brigadier General Walter F. Kraus
1926: Brigadier General Wilmot A. Danielson
1928: Brigadier General Grandison Gardner
1930: Brigadier General Lester D. Flory, Brigadier General George F. Schulgen
1931: Brigadier General Charles E. Loucks
1933: Brigadier General William C. Kabrich
1935: Brigadier General Edward Barber

Canadian Army

1913: Major General James V. Young

Chinese Army

1926: Major General Shih Ming Chu



Katden-Keystone Fernand de Gueldre Shelburne

TO THE CORPORATION

. . . these three Alumni have been named for term membership by the National Nominating Committee this year. They are, from left to right, Dr. William Jason Mixter, '02, surgeon, Boston; Harold B. Harvey, '05, President, Harvey Metal Corporation, Chicago; and Lewis W. Waters, '10, Vice-president in charge of scientific relations, General Foods Corporation, New York.

United States Navy

1901: Rear Admiral Ralph Whitman
1905: Rear Admiral Julius A. Furer, Vice-Admiral Russell Willson
1906: Rear Admiral Charles W. Fisher
1907: Rear Admiral Emory S. Land, Rear Admiral Roy W. Ryden, Rear Admiral Alexander H. van Keuren
1909: Rear Admiral Herbert S. Howard
1914: Rear Admiral Thomas B. Richey
1915: Rear Admiral Charles L. Brand
1917: Rear Admiral Frederick G. Crisp, Rear Admiral Ernest M. Pace, Jr., Rear Admiral Forrest P. Sherman, Commodore William A. Sullivan
1920: Rear Admiral Edward L. Cochrane
1921: Rear Admiral Lawrence B. Richardson, Rear Admiral Howard L. Vickery
1922: Rear Admiral Willard A. Kitts
1923: Rear Admiral Henry M. Mullinnix (missing in action)
1925: Rear Admiral Calvin T. Durgin

United States Coast Guard

1913: Rear Admiral Edward H. Smith

X in the Box

BALLOTS for the yearly election of officers and representatives of some 33,000 Technology Alumni are scheduled to go into the mails this month. Nominated for the presidency of the Alumni Association this year is Raymond Stevens, '17, XV, Arthur D. Little, Inc., Cambridge.

The National Nominating Committee of the Association — which comprises Samuel C. Prescott, '94, chairman, Charles A. Smith, '99, Orville B. Denison, '11, Frederick D. Murdock, '13, Frank Maguire, '17, Sherry O'Brien, '17, Edward E. Scofield, '19, Lauren B. Hitchcock, '20, Winter Dean, '21, and George W. Spaulding, '21 — has placed in nomination for the vice-presidency of the Association Alfred T. Glassett, '20, I, W. J. Barney Corporation, New York. For the Executive Committee of the Association, John D. Mitsch, '20, I, Associate Professor of Structural Engineering at the Institute, and James Donovan, '28, X, Artisan Metal Products, Inc., Boston, have been nominated.

For term membership on the Corporation of the Institute, the committee has named Dr. William Jason Mixter, '02, VII, surgeon, Boston; Harold B. Harvey, '05, VI, Harvey Metal Corporation, Chicago; and Lewis W. Waters, '10, V, General Foods Corporation, New York.

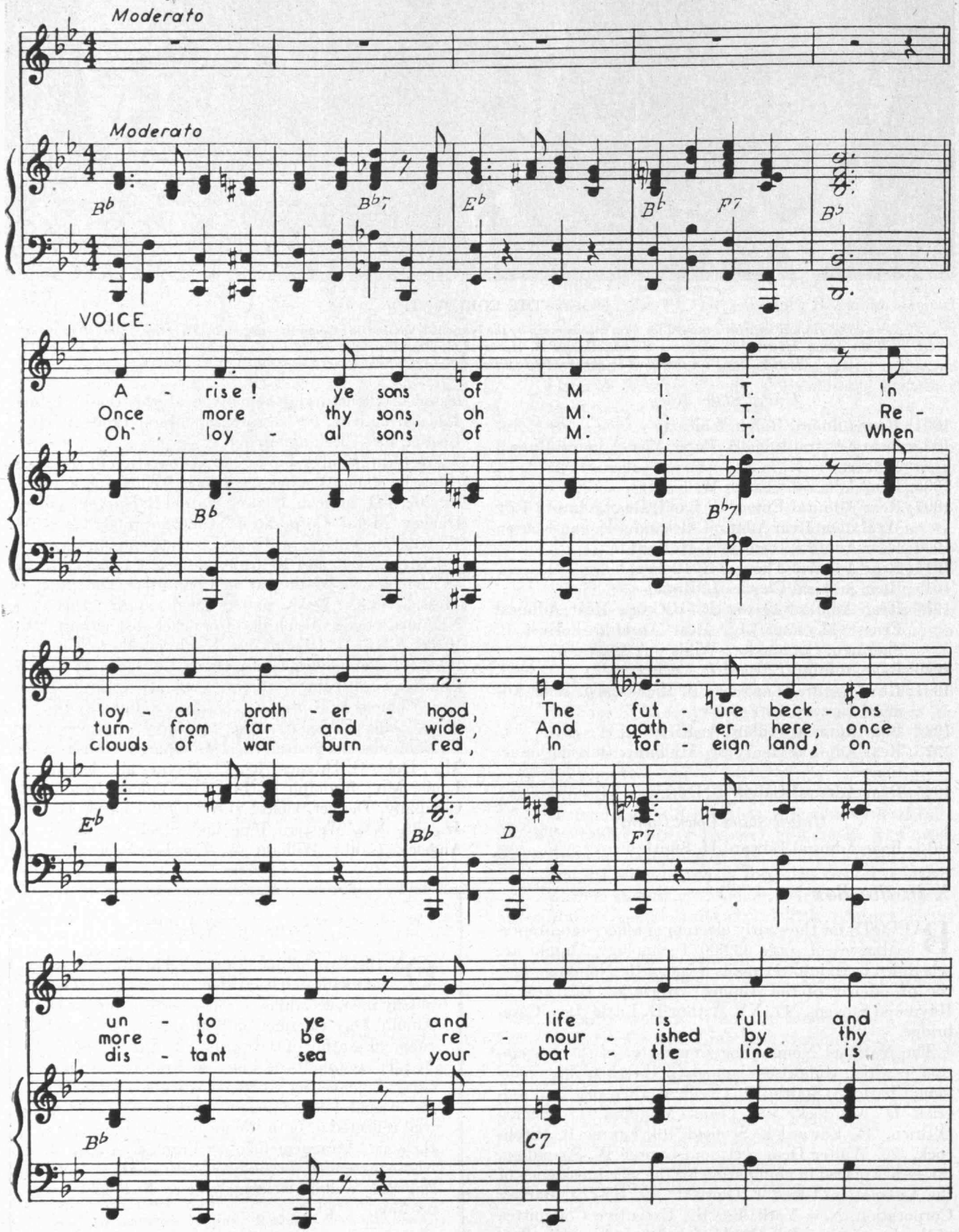
Districts 8, 9, and 10 are to have new representatives on the National Nominating Committee, the terms of Messrs. Smith, Dean, and Scofield expiring this year. Nominees, one to be elected from each district, are: *District 8:* Albert W. Higgins, '01, X, Florida Power Corporation, St. Petersburg, Fla.; Oscar G. Thurlow, '04, I, Commonwealth and Southern Corporation, Birmingham, Ala.; Thomas E. Huffman, '23, I, State Highway Department, Dallas, Texas; *District 9:* Harry L. Havens, '09, XI, Havens Structural Steel Company, Kansas City, Mo.; Delos G. Haynes, '09, VI, Haynes and Koenig, St. Louis, Mo.; Rudolph H. Fox, '12, Vulcan Iron Works Company, Denver, Colo.; *District 10:* Charles H. Toll, Jr., '23, XV, Western Pipe and Steel Company, Los Angeles, Calif.; William A. (*Concluded on page 298*)

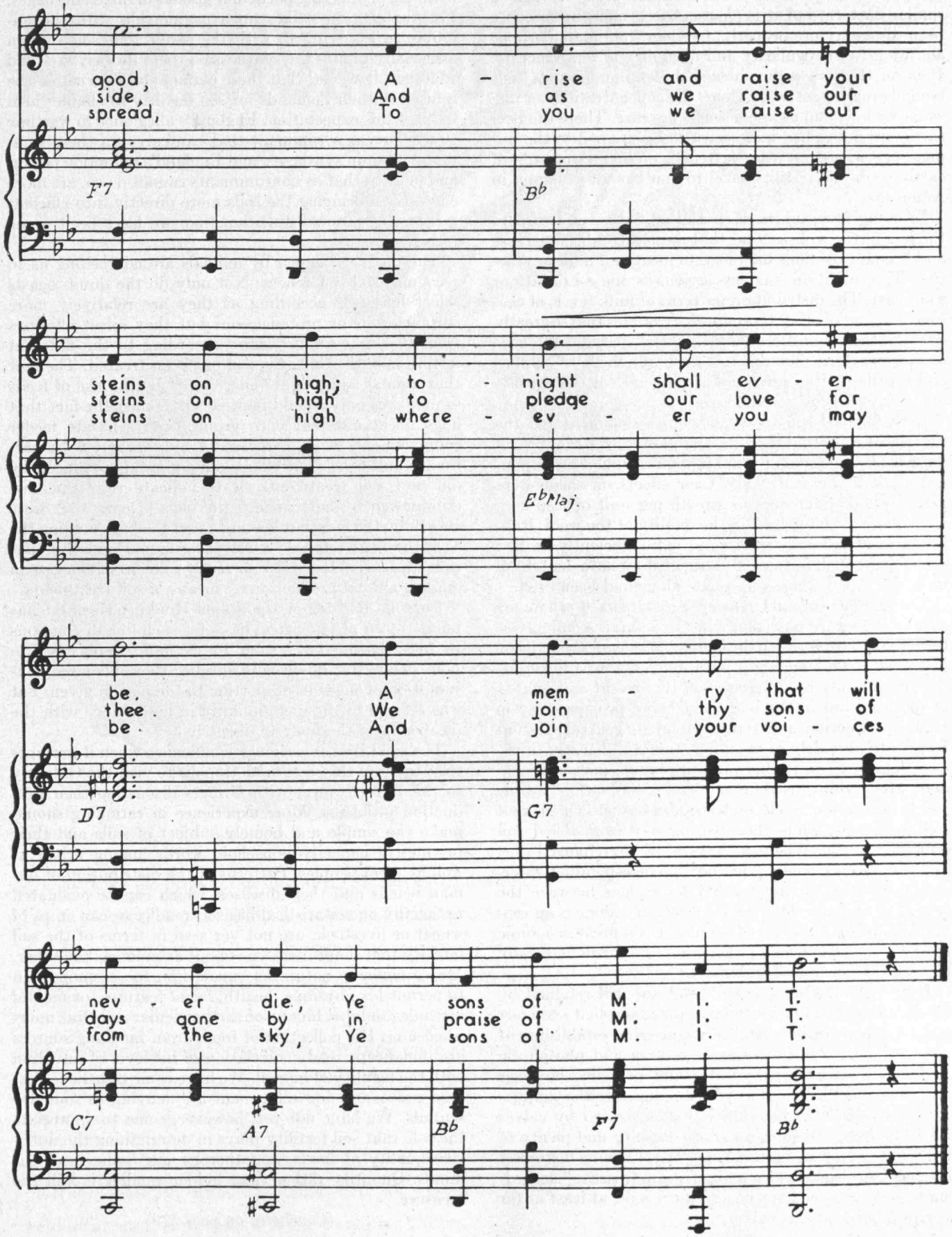
"Sons of M.I.T."

ON the two following pages, The Review presents with much satisfaction a song for Technology men, scheduled for first performance at the Alumni Day Banquet on Saturday evening, February 26. Author of the words and music of "Sons of M.I.T." is John B. Wilbur, '26, Professor of Structural Engineering at the Institute, whose constructional skill and sense of dynamic symmetry are well reflected in both the melody and the spirit of the song. Arrangement is by Frank D. Gage, '22, whose extended familiarity with making music ring the welkin welcomely here finds able expression.

SONS OF M.I.T.

Words and music by John B. Wilbur, '26 — Arranged by Frank D. Gage, '22




good, A - rise and raise your
side, And as we raise our
spread, To you we raise our
F7
B♭
steins on high; to - night shall ev - er
steins on high to pledge our love for
steins on high where - ev - er you may
E♭Maj.
be. A mem - ry that will
thee. We join thy sons of
be. And join your voi - ces
D7
G7
nev - er die, Ye sons of M. I. T.
days gone by in praise of M. I. T.
from the sky, Ye sons of M. I. T.
C7
A7
B♭
F7
B♭

SOIL FERTILITY, FOOD SOURCE

(*Continued from page 261*)

numerous that only their pelts were commonly taken. The distribution of domestic animals today reveals a similar pattern, but it is characterized more by freedom from disease (more properly, freedom from malnutrition) and by greater regularity and fecundity in reproduction. It is on the lime-rich, unleached, semihumid soils that animals reproduce well. There the concentrations of diseases are lower and some diseases are rare. There the beef cattle are multiplied and grown to be shipped to the humid soils where they are fattened. Similar shipments of cattle from one fertility level to another are common in Argentina.

In going from midwestern United States eastward to the less fertile soil, we find that animal troubles increase and become a serious handicap to meat and milk production. The condition is no less serious as one goes south or southeast. The distribution patterns of milk fever, of acetonemia, and of other reproductive troubles that so greatly damage the domestic animal industry parallel the soil-fertility pattern. Troubles in the milk sheds of eastern and southern cities are more a challenge for the agronomists than for the veterinarians.

Experimental soil treatments have demonstrated the important roles that calcium and phosphorus can play in animal physiology and reproduction. Applied on adjoining plots of the same area, their effects on sheep were registered as differences in growth per unit of feed consumed and as differences in the quality of the wool. Rabbits also grew more rapidly and more efficiently on hay grown where limestone and superphosphate had both been used than where phosphate alone had been used.

The influence of soil fertilizers registers itself pronouncedly in the entire physiology of the animal, seemingly so far removed from the slight change in chemical condition in the soil. This fact was indicated, in the study mentioned, not only by differences in the weight and quality of the wool but in the bones and more pronouncedly in semen production and reproduction in general. Rabbit bones varied widely in breaking strength, density, thickness, hardness, and other qualities beside mass and volume. Male rabbits used for artificial insemination became sterile after a few weeks on lespedeza hay grown without soil treatment, while those eating hay from limed soil remained fertile. When the hays were interchanged during the second feeding period, a corresponding interchange of sterility and fertility took place between the groups of animals. This factor of fertility alone is an economic liability on less fertile soil but is a great economic asset on the soils which either are more fertile naturally or are made so by soil treatments.

Instincts for wise choice of food are still retained by animals in spite of our attempts, for example, to convert the dairy cow into a chemical engineering establishment wherein her ration is as simple as urea and phosphoric acid mixed with carbohydrates and proteins, however crude. That milk cannot as yet be reduced to the simplicity of chemical engineering is demonstrated by calves which have rickets despite ample sunshine and plenty of milk if they grow on certain types of soil having distinctly low fertility. Rickets as a malnutrition "disease" according to soil type need not be a new concept, at least as far as this trouble affects calves.

Notwithstanding our attempt to relegate the cow into the lower levels in the biotic pyramid, even down to that of plants and microbes that alone can live on chemical ions not requisite as compounds, she still clings to her instincts of selecting particular grasses in mixed herbages. Fortunately she strikes up a partnership with the microbes in her paunch, with the result that some seven essential vitamins are synthesized there for her. We tend to forget, however, that these paunch dwellers cannot be refused in their demands for soil fertility to enable them to meet this expectation. England's allegiance in wartime to the cow as a ruminant that can carry on these symbiotic vitamin syntheses, and England's reduction of pigs and poultry that as nonruminants cannot do so, are more effective in bringing the soils more directly into efficient service for national nutrition than we have been prone to believe.

The instincts shown by animals are compelling us to recognize soil differences: Not only do the dumb beasts select herbages according as they are relatively more carbonaceous or proteinaceous but they select offerings from the same kind of grain according to the different fertilizers with which the soil has been treated. The fact that animal troubles are engendered by the use of feeds in mixtures only should be weighed against the fact that hogs select different corn grains from separate feeder compartments with disregard of hybrids but with particular and consistent choice among grains produced by different soil treatments. Rats indicate the same discrimination by cutting into the bags of corn that were chosen by the hogs but leaving uncut the bags holding the corn the hogs refused. Surely the animal appetite that calls the soil fertility so correctly can be of service in guiding animal production by means of soil treatments.

Curt P. Richter of the Johns Hopkins Hospital has pointed to a physiological basis for such fine distinctions by rats. Deprived of insulin, for example, they ceased to take sugar. But dosed with insulin, they increased consumption of sugar in proportion to the insulin given. Fat was refused in the diet similarly in accordance with the incapacity of the body to digest it.

The soil takes on national significance when it prompts the Mayor of the eastern metropolis to visit the Gateway to the West to meet with farmers discussing their production problems. More experience in rationing should make the simple and homely subject of soils and their productive capacity household words among urban as well as rural peoples. Patterns of the distribution of human beings and their diseases, which can be evaluated nationally on a statistical basis as readily as can crops of wheat or livestock, are not yet seen in terms of the soil fertility that determines one about as much as the other. Man's nomadic nature has made him too cosmopolitan to permit his physique, health, facial features, or mental attitudes to label him as of the particular soil that nourished him. His collection of foods from far-flung sources also handicaps ready correlation of his level of nutrition with the fertility of his soil. We have come to believe that food processing and refinement are denying us some essentials. We have not yet, however, come to appreciate the role that soil fertility plays in determining the nutritive quality of foods, and thereby our bodies and our minds. Quantity rather than hidden quality is still the measure.

(*Concluded on page 279*)

AN INTRICATE DIE-PRESSED ALUMINUM FORGING

by REVERE

Weight: 1¾ lbs.; length: 9"; extreme width: 6"

The intricate die-pressed housing pictured above is really quite a job. It is typical of other difficult die-pressed aluminum forgings that Revere can supply in a wide variety of shapes and weights with a wide range of applications. The aviation industry alone has eagerly availed itself of these strong, close-grained, intricate die-pressed aluminum forgings and will attest their economy and utility. Revere forgings are also available in copper, various copper-base alloys and magnesium.

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THE TECHNOLOGY LOAN FUND BOARD

REPORT FOR THE YEAR 1943

Principal repayments during the year exceeded new loans made by *over threefold*, and 1,319 men — over 53% of the 2,551 receiving loans since the Fund was established in 1930 — had completely discharged their financial indebtedness by December 31, 1943. Many of these 1,319, and others as well, had taken advantage of the provision that "payments may be anticipated," for $89,816.89 of notes were paid off during 1943 *in advance of maturity*.

Such cooperation is especially appreciated in these times because it has enabled the Loan Fund Board to continue to bear the cost of insurance protection on all outstanding obligations despite the markedly higher "war risk" premium rates occasioned by men in the military or naval services.

The data given below summarize the Fund's transactions during 1943 together with the cumulative figures for the past thirteen years.

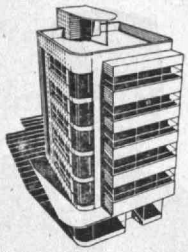
THE TECHNOLOGY LOAN FUND BOARD
K. T. Compton
H. S. Ford
B. A. Thresher
D. L. Rhind, *Secretary*
H. E. Lobdell, *Chairman*

Cambridge,
February 1, 1944

Cumulative Record of the Fund from its establishment in 1930 up to December 31, 1943, and the corresponding figures up to December 31, 1942, together with the net changes during 1943.

ITEMS OF OUTGO	*At Dec. 31 1942*	*At Dec. 31 1943*	*Net Changes during 1943*
Number of men receiving loans	2507	2551	+44
Total amount loaned	$1,807,788.75	$1,862,925.75	+$55,137.00
Average per capita loan	$746.05	$729.33	−$16.72
ITEMS OF INCOME			
Number of men whose indebtedness has been completely discharged	1142	1361	+219
Principal repayments in *advance*	$256,856.90	$346,673.79	+$89,816.89
Other principal repayments	681,583.57	772,602.97	+ 91,019.40
Total principal repayments	$938,440.47	$1,119,276.76	+$180,836.29
Total principal matured, considering "advance repayments" as matured when paid	$998,929.46	$1,169,149.99	+$170,220.53
Collection ratio, i.e. percentage of total maturities paid	**93.9%**	**95.7%**	**+1.8%**
Matured principal in arrears	$58,091.64	$47,475.88	−$10,615.76
Actual "written off" accounts	2,397.35*	2,397.35*	(*no change*)
Total maturities unpaid	$60,488.99	$49,873.23	−$10,615.76
Interest received	$155,699.38	$173,266.47	+$17,567.09
NOTES OUTSTANDING	$866,950.93	$741,251.64	−$125,699.29

* Of seven men, deceased prior to 1938 and not covered by insurance.



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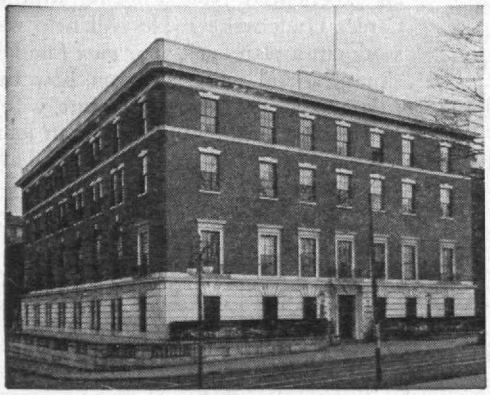

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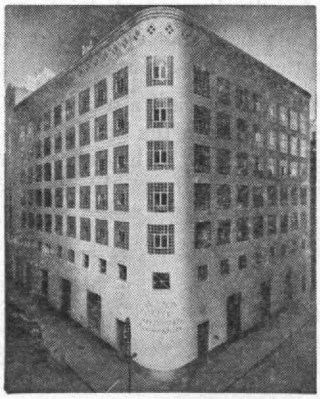
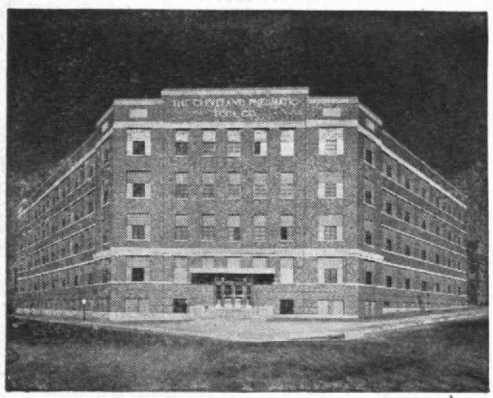


Aetna Life Affiliated Companies Building, New York, N. Y.



The Cleveland Pneumatic Tool Company Office Building, Cleveland, Ohio

SOIL FERTILITY, FOOD SOURCE

(*Concluded from page 274*)

Now that we are thinking about putting blanket plans over states, countries, and possibly the world as a whole, there is need to consider whether such regulations can blot out the economics, customs, and institutions which have established themselves as a counterbalance to the soil's fertility, if not, indeed, as a mirror image of the distribution pattern of soil fertility. Since any civilization is actually premised on its resources rather than on its institutions, changes in the institutions cannot usefully be made in disregard of so basic a resource as the soil.

Researchers in soil science, plant physiology, ecology, human nutrition, and other sciences have given but a few years of their efforts to human welfare. These contributions have looked to hastened consumption of material surpluses from unhindered production for limited territorial use. They are now to be applied to production, and a production that calls for use of nature's synthesizing forces for food production more than to simple nonfood conversions. When our expanded chemical industry is permitted to turn from wartime to peacetime pursuits, it is to be hoped that a national consciousness of declining soil fertility can enlist our sciences and industry into rebuilding and conserving our soils as the surest guarantee of the future health and strength of the nation.

PENICILLIN — PROGRESS AND PROBLEMS

(*Continued from page 263*)

Unlike the sulphonamides, which are of entirely synthetic origin and which have no structural equivalents in nature, penicillin is a natural product. But these same "natural" characteristics introduce unexpected difficulties in the chemical processes of manufacture. The production of penicillin is a difficult and delicate microbiologic process, influenced by a host of factors the slightest variation of which may alter seriously the yield and potency of the material. As Dr. Thom humorously stated to the writer: "The penicillin mold is a living thing, and ornery, as living things are. The problem in penicillin production is mainly adjusting technical practice to the habits of a fungus and making the process go the way the fungus wants it to go." Selection of a high-potency strain of *P. notatum* is of importance, as strains of the mold from different sources vary widely in their ability to produce the drug. The proper strain assures maximum formation of penicillin during the incubation process.

To provide a subculture for manufacturing purposes, a loopful of Penicillium spore mixture is spread over solidified agar. Incubation for about five days gives an abundance of grass-green spores with which more agar is inoculated. Thus sufficient inoculum is provided for several hundred flasks containing a suitable liquid medium. In the course of a seven- to fourteen-day incubation, the spores, floating on the surface, germinate and form white, cottonlike, vegetative surface patches. Ultimately the patches spread out into a complete, though thin, surface carpet, meanwhile exuding into the liquid medium the yellow pigment, chrysogenin. About the sixth day, the white mat begins green-spore formation, and the pellicle commences to wrinkle until it finally bears numerous convolutions. During this process, penicillin is excreted

into the medium in amounts dependent on the potency of the culture, the composition of the medium, the hydrogen-ion concentration, and the presence of trace elements, particularly zinc. Below a certain *p*H level, another antibacterial substance, notatin, may be formed at the expense of the production of penicillin.

When penicillin concentration in the medium has reached a maximum, the liquid is separated from the mold by filtration, and the clear broth is extracted with suitable organic solvents. Large volumes of dilute penicillin culture fluid must be extracted. Because of the instability of the active agent, the extraction should be carried out rapidly, at low temperature, and without exposure to microbial contamination. Penicillin is inherently unstable in culture broth and also is destroyed by certain bacterial and other contaminants which grow readily in the culture fluid. To accomplish penicillin extraction on a factory scale offers a challenge to the ingenuity of our chemical engineers. There being no time for extensive pilot-plant development, novel types of extraction equipment had to be designed on the basis of laboratory data only. All through the process, careful control and delicate adjustment of temperature and acidity are provided, and bacterial contamination is prevented.

In order to reduce the drug to its final form, ready for medical use, the water solution containing penicillin is subjected to high-vacuum evaporation, at low temperature so as to avoid destruction of the heat-sensitive material. The finished drug, the sodium salt of penicillin, is an orange-colored, solid concentrate of the active agent.

As there is no specific chemical test for penicillin, progress of the manufacturing process must be checked by microbiologic assay. Penicillin may be measured as an inverse function of the growth of *Staphylococcus aureus* in nutrient broth, since graded doses of penicillin produce, quantitatively, a proportional inhibition of growth of *S. aureus*. The staphylococcic growth can be measured turbidimetrically, and the penicillin thus can be quantitatively estimated within 10 to 15 per cent.

To date, however, the most widely used method of estimation is the more practical "cup method" originally devised by Heatley. In the present form of the cup assay method, agar plates seeded with the test organism have small glass cylinders placed as cups on the surface. These cups are filled with the solution under assay. During incubation, the penicillin diffuses radially through the agar, the degree of diffusion being proportional to the penicillin concentration. Within the area containing sufficient penicillin to inhibit test bacteria, a circular clear zone of inhibition develops in contrast to the turbid area of the plate. The zone diameters are compared with those of zones similarly prepared from standard penicillin solutions.

Lack of vigilance at any point in the manufacturing process may result in the loss of an entire batch, as no chemical correctives can be applied in this microbiologic process. Yield — the yardstick of chemical manufacturing efficiency — varies unpredictably with the slightest changes, or even with no detectable change, in the nature of the medium and in the conditions of growth of the mold. The manufacturing processes thus far employed all operate on the microbiologic, or fermentation, principle, using either the stationary (flask) or agitation (tank)

(*Concluded on page 282*)

KEEPING UP WITH *Electricity*

1000 REVOLUTIONS PER SECOND! That's the speed of newest Westinghouse motor, producing a tool surface speed of 7,000 feet per minute. This 4 horsepower induction motor has a rotor only 2 inches long, diameter 1¾ inches. Westinghouse engineers are now developing a motor to go *twice as fast.*

B'R'R'R'R'R . . . A polar bear would be right at home at 20° below zero in the Westinghouse "igloo" at East Pittsburgh. This cold chamber is 1500 times as large as the average electric home refrigerator. Here, Westinghouse engineers test ice-coated circuit breakers and other electrical switching equipment, to guarantee operation under worst winter conditions.

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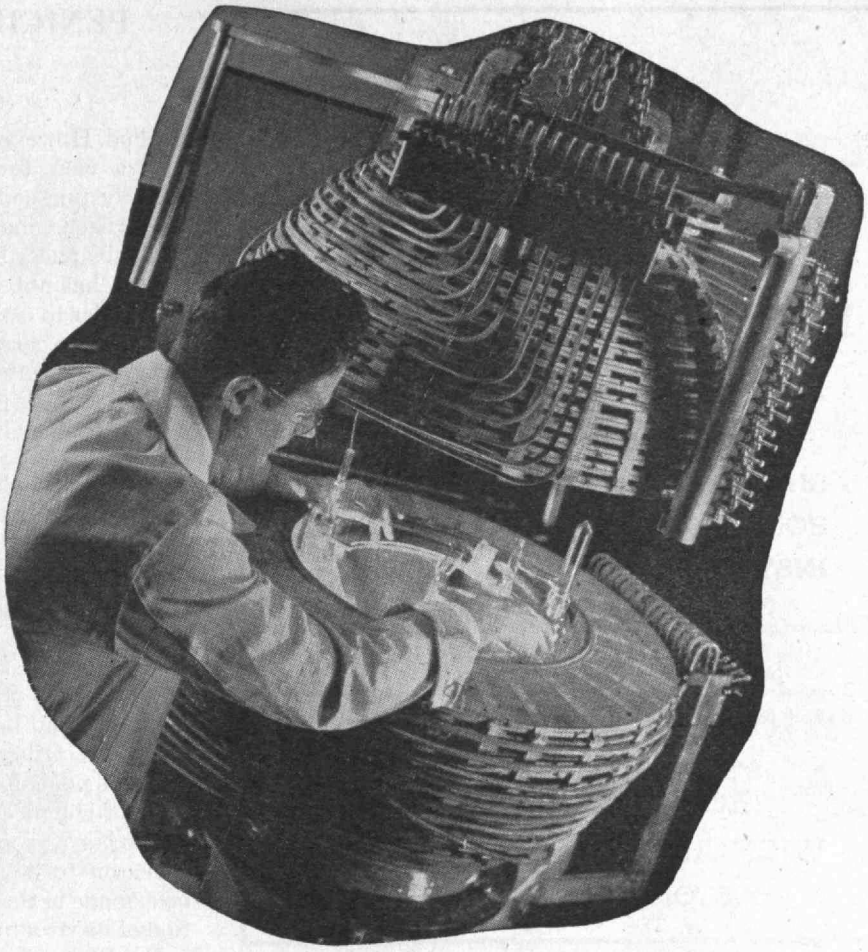
AIR IS HEAVY STUFF when you start pushing it around at 400 miles an hour. That's why U. S. Army needed a 40,000 horsepower electric motor to create a man-made hurricane, for testing airplanes in Wright Field wind tunnel. It is the world's largest wound-rotor induction motor, designed and built by Westinghouse engineers.



Chemical analyses—*right now!*

Above is the laboratory model of the Westinghouse mass spectrometer, which sorts out dissimilar molecules according to their mass, and does it almost as fast as you can snap your fingers.

The mass spectrometer provides a new way to get the quick, accurate analyses that are needed to maintain precise process control. Take the synthetic rubber industry, for example. Formerly, five men took as long as three days to complete necessary chemical tests in the processing of artificial rubber—which meant that the results were often too late to be useful.

The new electronic "chemist," the Westinghouse mass spectrometer, now makes these tests in about 15 minutes.

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PENICILLIN—PROGRESS AND PROBLEMS

(*Concluded from page 280*)

method. However, research on the chemistry of penicillin, with a view toward eventual synthesis of it, is being actively pursued. The prospects for synthesis have recently been enhanced by the isolation of the pure crystalline substance, but its molecular structure, so far as is known, has not yet been determined.

In order to establish the empirical formula of penicillin and then to carry out the necessary determination of its constitution prior to attempting synthesis, samples of absolutely pure penicillin in crystalline form are a prerequisite. By distribution between solvents, treatment with charcoal, reduction of aluminum-mercury couple, and chromatographic adsorption, the English workers E. P. Abraham, E. Chain, and E. R. Holiday succeeded two years ago in preparing a barium salt of penicillin which appeared by chromatographic analysis to be homogeneous and which had an activity of about 500 Oxford units per milligram.[1] In November, 1942, other English workers — J. R. Catch, A. H. Cook, and I. M. Heilbron — reported that penicillin of strength as high as 750 Oxford units per milligram had been obtained by a new chromatographic technique. Other workers have since reported the occurrence of penicillin salts of much higher activity. On the basis of chemical analysis of these impure preparations, various provisional formulas have been postulated. There is reason to believe that significant progress has lately been made in the purification of penicillin and the elucidation of its structure, but public disclosure cannot be made.

Dr. Richards predicted in the *Journal* of the American Medical Association for May 22 that "there is good reason for the belief that it [penicillin] is far superior to any of the sulfonamides in the treatment of Staphylococcus aureus infections with and without bacteremia, including acute and chronic osteomyelitis . . . pneumonia and empyema, infected wounds and burns. It is also extremely effective in the treatment of hemolytic streptococcus, pneumococcus and gonococcus infections which are resistant to sulfonamides."

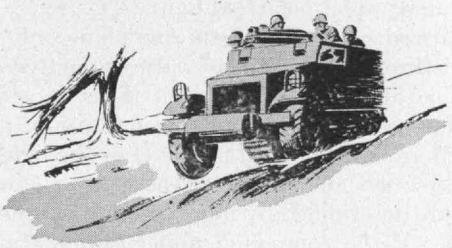
Clinical results since obtained have more than confirmed these predictions, as attested by the almost miraculous performance of penicillin in the treatment of war wounds at the Army's Bushnell General Hospital in Utah and Halloran General Hospital on Staten Island. The uses for penicillin promise to go beyond the field of bacterial infection if preliminary trials which Dr. J. F. Mahoney of the Public Health Service has made with penicillin in treating syphilis can be confirmed.

It is reasonable to expect that the chemical synthesis of penicillin will, in due time, be perfected, thereby giving assurance of a plentiful, low-cost supply of the valuable drug. With the knowledge of penicillin's molecular structure, other compounds may be found which are structurally similar to and equally active as penicillin, but perhaps easier to use. It is indeed possible that a whole new group of materials similar to this most powerful of all known chemotherapeutic agents will be made available.

[1] At present, penicillin is "measured" in terms of "Oxford units." This arbitrary unit is defined by Florey and M. A. Jennings as that amount of penicillin which, when dissolved in 50 cubic centimeters of meat extract broth, just inhibits completely the growth of the test strain of *S. aureus*. Penicillin is distributed as the sodium salt in ampoules containing 10,000, 100,000, and 1,000,000 Oxford units of potency.

On the Job for Victory

YESTERDAY



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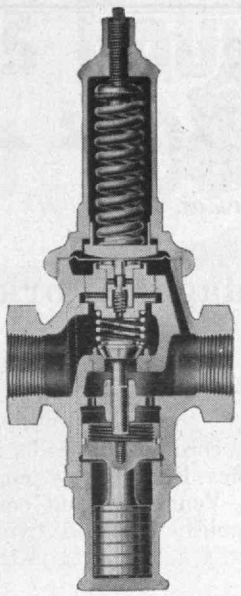

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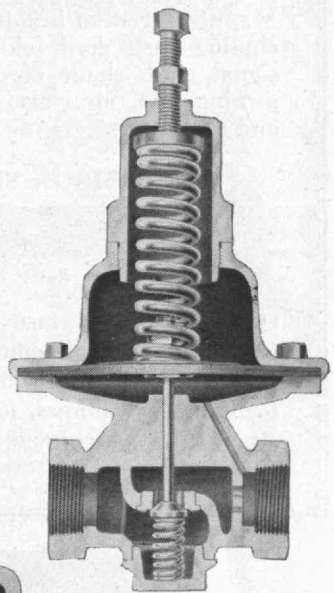

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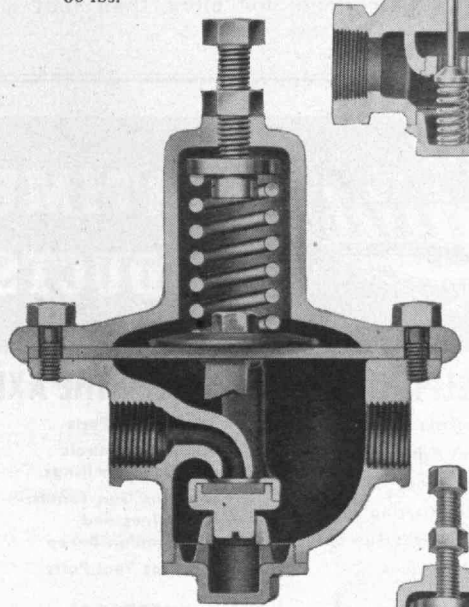

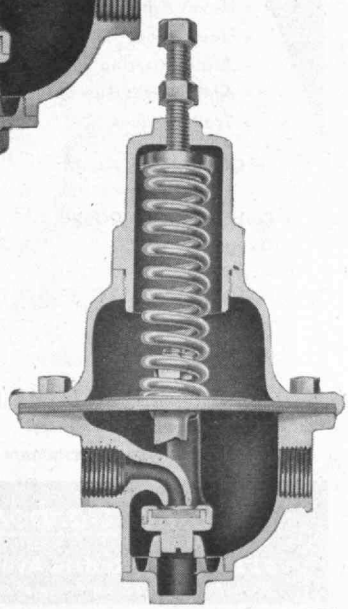

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CHEMISTRY IN THREE DIMENSIONS

(*Continued from page 267*)

grape, which precipitates during fermentation of the juice to make the lees of wine and which also forms on the sides of the wine cask a crystalline incrustation called "argol." This discovery resulted from his observation that crystals of the sodium ammonium salt of tartaric acid, seen under the microscope, presented two different arrangements of the crystalline facets; one of these he saw to be the mirror image of the other. Thus our theme of mirror images repeats in fuguelike fashion.

Pasteur laboriously sorted the two crystal types, finding that while they possessed identical chemical properties, the solution of one type rotated the plane of polarized light clockwise, or to the right, and the solution of the other rotated it counterclockwise, or to the left. He therefore qualified their names by prefixing the Latin-derived "dextro" to the former and "levo" to the latter. With one important exception, which arises from conventional adherence to arbitrary nomenclature among the carbohydrates, the *d* and *l* prefixes to the names of stereoisomers still retain the physical significance given them by Pasteur, thus indicating the rotatory power of these compounds upon polarized light.

Polarized light vibrates in one plane only. When it is passed through solutions of optically active compounds, or even through the vapors of those substances which may be vaporized without decomposition, this plane is rotated around the path of travel of the light as an axis. The direction and extent of the rotation, readily measured, are determined by four factors: the inherent optical activity of the compound under examination, the concentration of the substance, the length of the column through which the polarized light passes, and the temperature. In the polariscope, the length of column and the temperature are held constant, so that only a third value need be known to establish the fourth. Hence if a solution of a pure substance of known concentration is placed in the polariscope, the ability of the dissolved compound to rotate light is easily determined. Conversely, the polariscope is an invaluable tool in the quantitative determination of substances of known optical activity, as in the analysis of foods for their sugar content.

Ever since Robert R. Williams by the synthesis of thiamin, or vitamin B_1, consummated a quarter century of brilliant research, all performed avocationally while his workaday hours were occupied in other applications of his scientific genius, chemists have been jig-sawing

(*Continued on page 286*)

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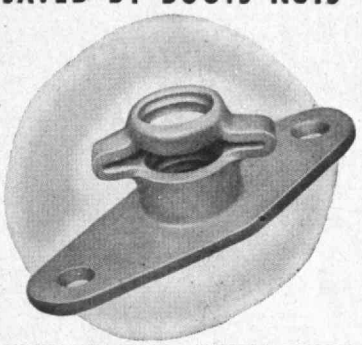

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CHEMISTRY IN THREE DIMENSIONS

(*Continued from page 284*)

together the most complex organic molecules from their component atoms and radicals. Today, once a naturally occurring substance has been isolated, purified, and identified, only assurance of its commercial importance is required to initiate research leading toward successful synthetic reproduction of it in the laboratory. These syntheses are wholly successful with those compounds possessing no asymmetric carbon atoms, for here the synthetic product is indistinguishable from the naturally originated one chemically, physically, and in physiological effect within the living organism. In contrast, where asymmetric carbon atoms do occur, the otherwise spectacular achievements of organic synthesis meet sharp delimitation, because up to the present moment *no progress whatsoever* has been made toward controlling the arrangement of atoms or radicals attached to the asymmetric carbon.

Since the organic chemist cannot govern the spatial relations of the asymmetric carbon, these arrangements during his syntheses in the laboratory are controlled solely by the laws of chance. Therefore when a substance is made whose molecule contains a single asymmetric carbon, the chances are equal for the formation of the *d* or of the *l* isomer, so that exactly equal proportions of the two are formed, resulting in the racemic mixture. Here the optical activity of the two forms cancels out, and these mixtures exercise no rotatory power upon polarized light. On the other hand, stereoisomeric compounds made in

(*Continued on page 288*)

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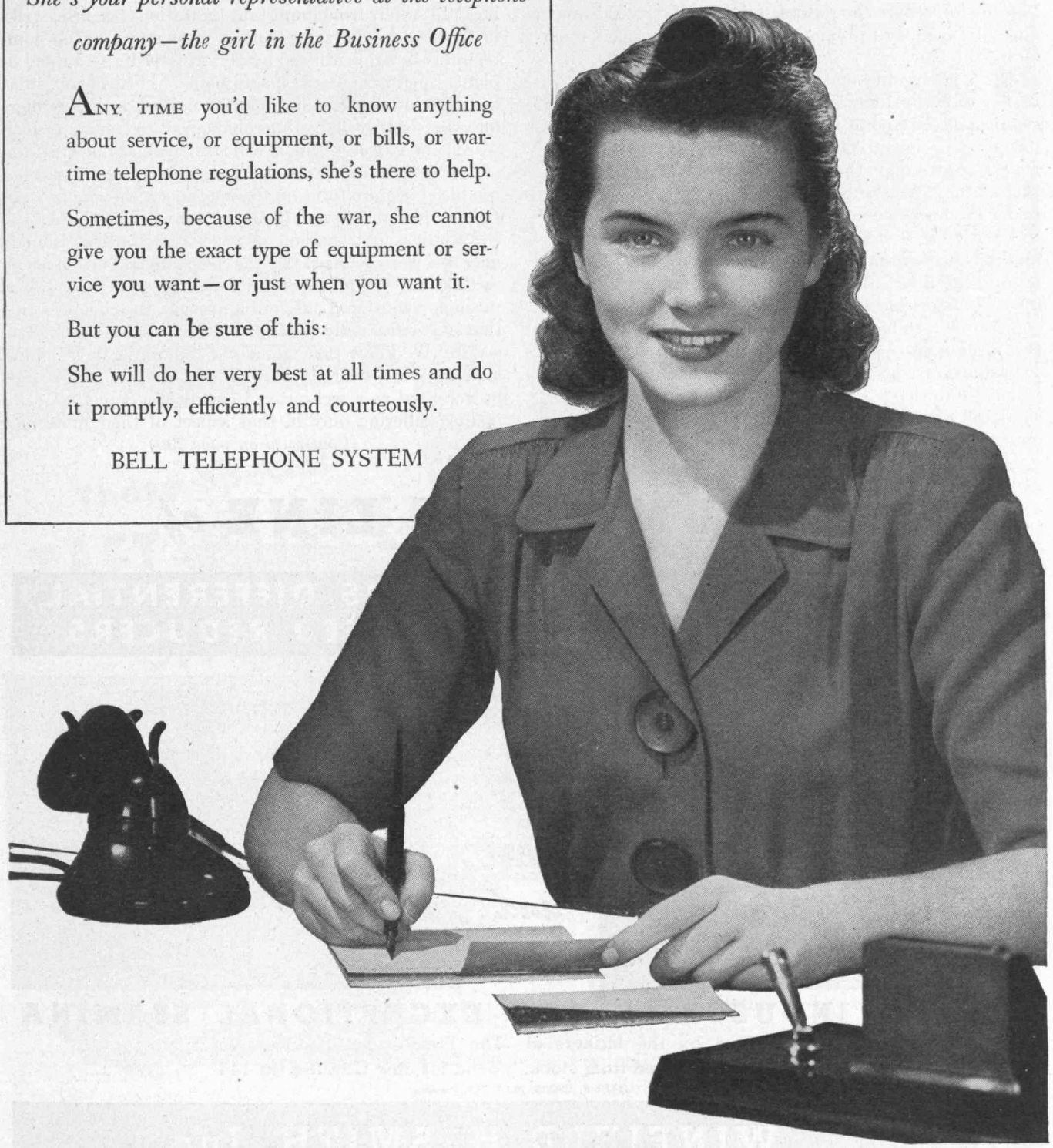

When you are calling over war-busy Long Distance wires, the operator may ask you to "please limit your call to 5 minutes." That's to help more calls get through during rush periods.

CHEMISTRY IN THREE DIMENSIONS

(*Continued from page 286*)

the living organism — whether animal or plant — are inevitably one or the other of the optically active forms *in the pure state*. By the same token, only the naturally occurring isomer will be utilized by the living organism, as already shown with pantothenic acid. Despite this fact, the synthesis of most organic compounds is so vastly cheaper than isolation and purification of them from natural sources that it remains economically advantageous to prepare the racemic mixture of optical isomers and subsequently to remove or destroy the useless member of the pair.

Although organic synthesis was in a rudimentary state in his day, Pasteur apparently grasped the potential significance of laboratory preparation of optical isomers, for he laid down and perfected the three procedures which today remain the sole methods available for separation of these substances. The tedious sorting of crystals under the microscope, which for Pasteur opened the door to knowledge of stereoisomerism, is obviously one of the methods for separating isomers of this type. Just as obvious are the inherent limitations which make this procedure of historical interest only, for many optically active compounds produce crystals too small to be handled in this fashion and some do not crystallize at all.

Pasteur recognized, within the framework of the physiological knowledge of his time, the precise powers exercised by all living organisms in differentiating between optical isomers. Using this knowledge, he sought a second method for separating these compounds. Working still with the tartaric acid of his country's beloved wines, he learned that a mold called *Penicillium glaucum* (member of the same genus as the *Penicillium notatum* which produces the penicillin of such topical interest today) could, when grown in solutions of the racemic mixture, utilize *d*-tartaric acid in its metabolism, thus destroying it. At the same time, and in typical fashion, the *l* isomer was left untouched and could subsequently be isolated in pure form from the culture medium. This method, while of more practical interest than microscopic crystal sorting, still suffers from important limitations because, strikingly enough, the same optical isomer of a given compound is as a rule utilized by all forms of life — animal or plant, microscopic or macroscopic. This means that usually only a particular one of a pair of optical isomers may be destroyed by microbiological activity, and all search for cultures which will utilize the opposite form almost inevitably proves futile. Furthermore, the isomer produced in pure form by this method is the one less apt to be of physiological value and commercial interest.

Pasteur's first method of separating optical isomers may be characterized as the mechanical, or physical, method; the second, as the microbiological method. It was through a third and different approach, the chemical one, that Pasteur finally perfected a truly satisfactory procedure. We know that stereoisomers are, in their spatial arrangements, mirror images of one another. Let it now be accepted as a well-proved chemical axiom that compounds differing only in that aspect of their molecular

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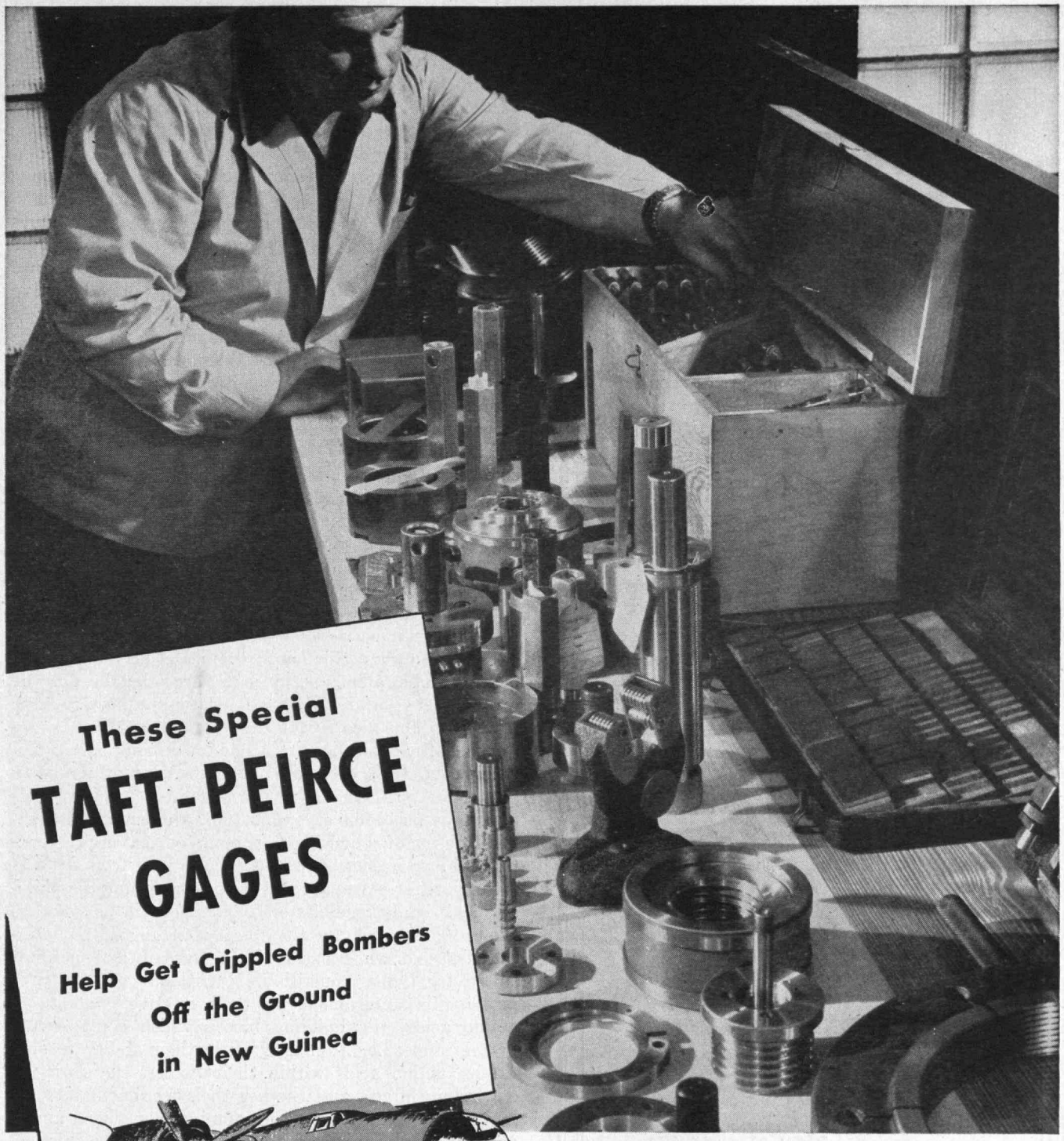

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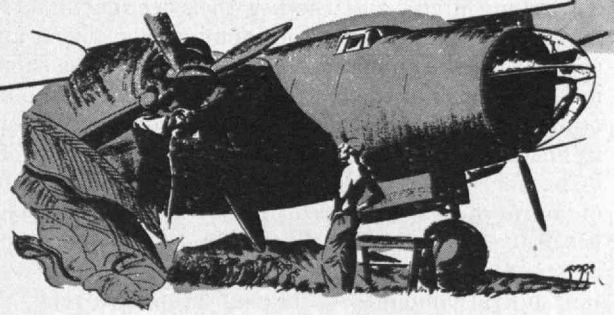

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CHEMISTRY IN THREE DIMENSIONS

(*Continued from page 288*)

constitution differ not at all in their chemical characteristics and hence cannot be separated by chemical means. However, if one of the stereoisomers of another optically active substance be attached to the molecules of stereoisomers existing in a racemic mixture, the mirror-image relationship no longer exists. To prove this, let us turn to an application of the human hand analogy made by James Bryant Conant in his excellent *Organic Chemistry: A Brief Introductory Course*. Consider the racemic mixture as a collection of pairs of gloves, and the optically active substance to be used for the separation as a number of *right* mittens. Clearly the right and left gloves are mirror images of one another and are therefore inseparable; but to each tie one of the right mittens, and you create a conformational difference which cannot be resolved by viewing either form as its reflection in a mirror.

This last method is the one of practical laboratory and commercial application. Optically active compounds of a class called the "alkaloids" are employed, represented familiarly by quinine and strychnine. To possess the requisite optical activity, these alkaloids must come from natural sources. Quinine, for instance, is derived from the bark of the cinchona tree, which grows almost exclusively in territory now in enemy hands; meager stock piles in this country must be reserved to combat malaria among our armed forces. Adequate supplies of strychnine and other suitable alkaloids, however, are available for the commercial separation of synthetically produced racemic mixtures. The identity of the alkaloid is of no consequence; after it has been attached to the components of a racemic mixture, each then exhibits different solubility properties and hence is readily separated from its companion by fractional crystallization, whereupon the alkaloid fraction of the molecule is removed, leaving the dextro and levo isomers separate, each in pure form.

Support for our final contentions concerning the philosophical significance of stereoisomerism will be found in the proteins, which are the object of strong timely interest because of war-occasioned shortages of the types best suited for human nutrition. Nutritional suitability of proteins is determined by their relative contents of amino acids, the building blocks which compose the protein molecule. Animals vary in their ability to synthesize amino acids within their bodies, the variation depending largely on whether their feeding habits are herbivorous, carnivorous, or omnivorous; those amino acids which the animal cannot make have to be supplied in the proteins of the foods consumed. Man is an omnivorous creature who, for optimal nutrition, requires in his diet some protein of animal origin, these proteins being rich sources of those amino acids which the human organism cannot synthesize. That vegetarians may flourish does not controvert this last statement, because the eggs and dairy products which they freely consume contain liberal amounts of animal proteins. True, some national groups, as in the Orient, know no foods of animal origin, but their dietary deficiency is evidenced in stunted stature and listless temperament, if not more tangibly.

In various combinations and proportions, the relatively few amino acids make up all the different proteins of animal and vegetable tissues. With a single exception, all

(*Continued on page 292*)

CHEMISTRY IN THREE DIMENSIONS

(*Continued from page 290*)

the amino acids naturally occurring in living organisms contain at least one asymmetric carbon atom and hence can exist in differing stereoisomeric forms. A few of them contain two such asymmetric carbons; by the application of some elementary mathematics, it follows that these may exist as four different stereoisomers. The formula states that when a compound contains n asymmetric carbon atoms, it may exist in 2^n stereoisomeric forms. Despite these possibilities, all the naturally occurring amino acids, regardless of whether they are derived from the tissues of plant or animal, microbe or mammalian mammoth, always show precisely the *same spatial configuration* with respect to the asymmetric carbon atoms.

This fact highlights further what has already appeared, namely, the constancy of stereoisomeric substances in living things. Inheritance of gross tissue characteristics while cells multiply within the growing organism, inheritance of body form and color from generation to generation — these are truly marvelous indications of perfect functioning of the genetic mechanism. But do they not pale to commonplaces beside the passing along in similar sequences of a characteristic as subtle as the spatial configuration of asymmetric carbon atoms within amino acids composing the organism's proteins? No violation of this rule of constancy is known.

Pushing wider our perspective, we grasp what is the most amazing of the lessons of stereoisomerism: Not only does the same stereoisomer of a given amino acid always occur in a given plant or animal but this isomer is also the only form of the same amino acid which has ever been found in any living thing. Here truly is undeniable proof of a oneness of the living universe, be this an indication of evolutionary development from common ancestors or be this suggestion of a predominant, all-governing metaphysical intelligence.

(*Concluded on page 294*)

CHEMISTRY IN THREE DIMENSIONS

(*Concluded from page 292*)

Isolated examples have been singled out to show the biochemical importance of stereoisomerism; actually these illustrations are legion. The lactic acid which in the muscles is an intermediate product between glucose and carbon dioxide during the oxidation that provides energy for muscular work, is always the dextro form. The fatty acids, which with glycerol form the fats important as reservoirs of stored food-energy, show ramifications of stereoisomerism too complex to enter into here. Vitamin C is *l*-ascorbic acid. Vitamin B_2 is *d*-riboflavin, holding as a side chain of its molecule the sugar *d*-ribose, which in turn is a component of the nucleic acids. Thus the thread of stereoisomerism pervades the fabric of physiological chemistry.

Man in his otherwise astounding organic syntheses has attained no control whatsoever over spatial configurations with respect to asymmetric carbon atoms. Nature not only accomplishes such control but through all generations of all living things appears to have held this configuration immutable. When man learns how this is done, he will perhaps have rent the veil of one of the inner mysteries of life.

THE ELUSIVE ISLAND

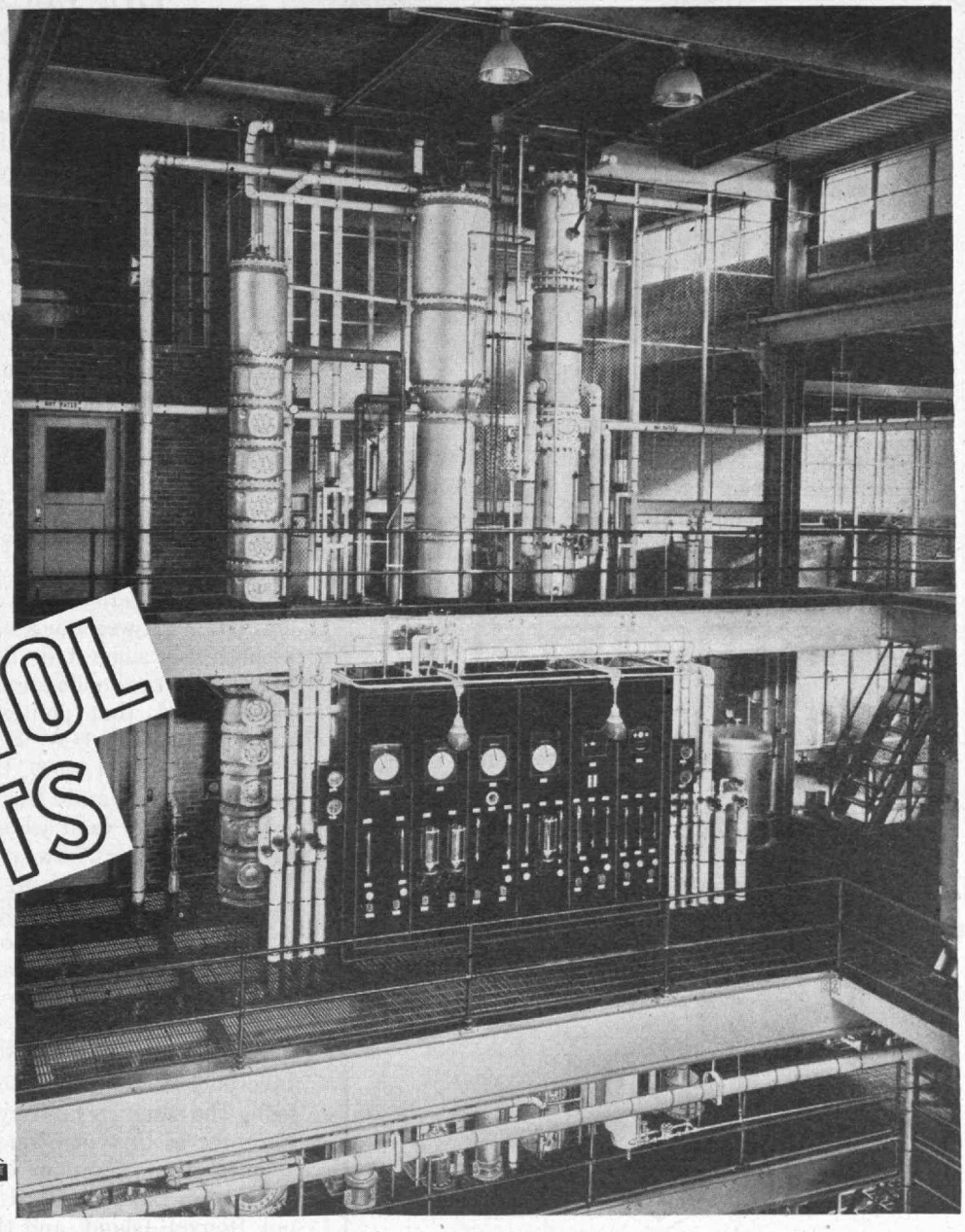
(*Continued from page 265*)

and that Captain Allen of the *Francis Allen* passed it in 1893. Actual rediscovery, however, did not take place until 1898. In that year the steamer *Valdivia* left Hamburg on a voyage of deep-sea exploration. The commander was Captain Adalbert Krech; leader of the scientific staff was Professor Carl Chun. The object of the trip was oceanographic exploration, deep-sea fishing, and the gathering of all kinds of scientific (mainly zoological) data. But since the route led around the southern tip of Africa, it was decided to sail farther south — weather conditions permitting — and look for Bouvet's island, Lindsay's island, Thompson Island, Liverpool Island, the Chimneys, Pagoda Rock, and so on, and so on.

The *Valdivia* arrived in the vicinity of Bouvet Island in November, 1898. She passed so close to Thompson Island that it would have been seen clearly if it had existed. Then she changed course and sailed across the spot where Liverpool Island was supposed to be. The course was then changed again and the steamer proceeded due west, across Lindsay's "island." Hope that anything would be found had almost been given up — the weather being atrocious most of the time — when an island was sighted which resembled Lindsay's in every respect. Only the position was not quite the same — Lindsay had placed his island too far east by about one degree.

The men in the *Valdivia* then realized why the island had caused so much trouble. It was shrouded in mist and only occasionally could the explorers get a glimpse of it. A landing was contemplated but could not be effected. Even without a landing, however, a fair map of the island could be produced. The island consists mainly of a large extinct volcano, partly covered by glaciers. After sailing around Bouvet Island, the *Valdivia* began a systematic search of the region to the north, looking for the various other islands and rocks reported by explorers as well as

(*Concluded on page 296*)



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DISTILLATION-EVAPORATION-EXTRACTION

PROCESSES AND EQUIPMENT

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THE ELUSIVE ISLAND

(*Concluded from page 294*)

whalers. There was none, and when the ship finally proceeded on her voyage, Captain Krech felt well satisfied that the complicated problem had been solved.

Later visits were mainly confirmations of his report.

The American surveying vessel *Carnegie* passed Bouvet Island in January, 1916. The position measured by the *Valdivia* was checked and found to be correct within a very small margin of error (three minutes of arc). Thompson Island and the Chimneys were sought but not found. The German surveying vessel *Meteor* became the next visitor (February 20, 1926). The captain, Z. S. F. Spiess, again went through the routine of looking for Thompson Island and the Chimneys (both were still on British admiralty charts) but found only water, varying in depth from 1,200 to 16,000 feet. The men in the *Meteor* saw Bouvet Island, passing by closely just to make sure it was still there, and looked (without success) for Liverpool Island.

The facts were then well established: Bouvet Island existed, but it was alone, not a member of an archipelago, as had been suggested. The original story was finished, but the political epilogue was still to be written. Like the island itself, that political epilogue was strange and useless.

On December 1, 1927, the Norwegian vessel *Norvegia*, under Captain Harald Horntvedt, reached Bouvet Island. A landing party went ashore and formally took possession of the island for Norway in the name of King Haakon VII. Since Bouvet Island is useless for *any* purpose, nobody should have cared. But the British Empire objected, claiming that Captain George Norris of the *Sprightly* had taken possession of the island in the name of King George IV.

Norris, however, had stated that he landed (and hoisted the British flag) on Thompson Island, not on Liverpool Island. Liverpool Island is usually regarded as being the same as Lindsay's island and Lindsay's island the same as Bouvet Island. The government of Norway claimed that Captain Horntvedt was right because Thompson Island is not Liverpool Island and, therefore, not Bouvet Island, and that Captain Horntvedt would have been right even *if* Thompson Island *were* Liverpool Island, and, therefore, Bouvet Island, because the British Empire had failed to maintain any claims it once *may* have had, even failing to place the right island on the admiralty charts (in fact, having the wrong one on them) and, furthermore, failing to have vessels of the Royal Navy call at the island. While the government of Norway said all this, the British Colonial Office countered with an attempt of proof that Thompson Island (the one on the admiralty charts) really and truly was Bouvet Island. In answer, a dozen experts were called in who swore that a large iceberg, after turning turtle and displaying the rocks in its bottom, can easily be mistaken for an island, as evidenced by an impressive list of just such occurrences.

Great Britain finally waived the claims on Bouvet Island in favor of Norway, maintaining that Thompson Island would be British provided it were found again. Norway, of course, never did anything with the 22 square miles of lava and ice over which such elaborate arguments had been held.

Nor is it likely that anybody ever will.

THE INSTITUTE GAZETTE

(*Concluded from page 271*)

MacQuarrie, Jr., '26, XV, Electric Storage Battery Company, San Francisco, Calif.

John W. Howard, 1879–1944

JOHN W. HOWARD, '03, for more than 40 years a member of the faculty of the Department of Civil and Sanitary Engineering, died on January 25. Serving as engineering field assistant to a commission on water supply of New York City after his graduation from the Institute, he was called in September, 1903, to begin his long career as a notable teacher in the Department of Civil Engineering. Named an assistant that fall, he became an instructor in 1905 and an assistant professor in 1913, and he held the rank of associate professor of topographical engineering from 1922 to the time of his death. He had been a member of the faculty of the Institute's summer surveying camp at Machias, Maine, for the past 30 years, and had been its director since 1934.

In 1912 Professor Howard went to Costa Rica as engineering representative of the commission appointed by President Taft to make a topographical survey for the establishment of the boundary between Panama and Costa Rica. During the first World War he served as instructor in navigation for United States naval students at Portland, Maine.

His achievements at the Institute included the establishment of the course in mining surveying for the Department of Mining Engineering, as a result of which he directed field work in Nova Scotia, in Vermont, and at Dover, N. J. In addition to his instruction in astronomy, geodesy, and plane and topographical surveying, he was interested in photogrammetry and aerial surveying and had been acting as consultant for the Army in this work. He also served as a member of the committee on surveying and mapping of the American Society of Civil Engineers.

Professor Howard was a member of the American Society of Civil Engineers, the Boston Society of Civil Engineers, the Society for the Promotion of Engineering Education, the American Society of Photogrammetry, and the American Geophysical Union. His fraternity was Lambda Chi Alpha. He was a former president of the alumni association of the Mechanic Arts High School, Boston, from which he was graduated in 1899.

The Answer Is Negative

TO answer a steady influx of inquiries from Alumni who are wondering, Charles E Locke, '96, Secretary of the Alumni Association, has recently sent to officers of M.I.T. clubs the following letter:

"Some Alumni report that they are receiving requests for biographical material for publication in a 'Who's Who in the Massachusetts Institute of Technology.' This has no authorization or sponsorship by the Alumni Association or by anyone at M.I.T., as far as we can learn. Will you kindly broadcast to your club members at the first opportunity this statement of our position and tell them that some Alumni have told us that they propose to disregard the publishers' request."

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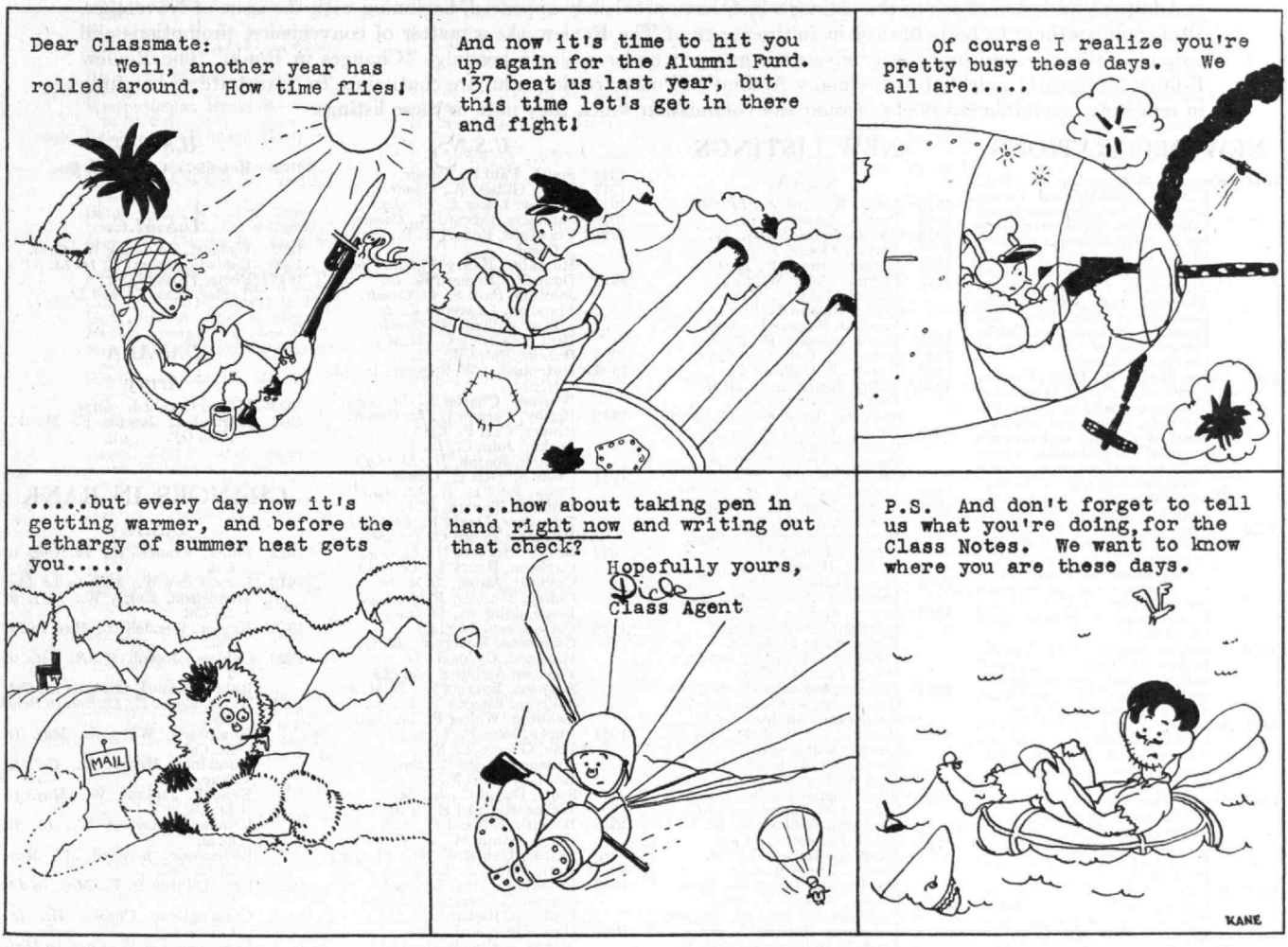
TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND—ITS PROBLEMS AND GROWTH

CLASS AGENT'S LETTER



IS that really the way a Class Agent's letter sounds on the receiving end? Not according to the record. This year to date 26 per cent of the Institute's 33,000 Alumni have contributed to their Fund. But more than one of every three Alumni in the services — 36 per cent, to be exact — have responded to their Class Agents' appeals.

As a matter of fact those letters aren't like that at all. Some of the men who write them are in the Army or Navy themselves. One (who has been temporarily released from his Fund duties) was recently awarded the Legion of Merit in Africa.

There's no moral. We just want the rest of the Alumni to know that those of you who are really fighting this war haven't forgotten the Institute. And you can be certain that the Institute hasn't forgotten you either. We are proud of the outstanding record you are making.

TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

Up to February 12 over 5,500 Institute Alumni, including 20 Admirals, one Commodore, and 68 Generals, were recorded as being in the active naval or military services of the United Nations. New additions this month included Rear Adm. Charles W. Fisher '06, Rear Adm. Frederick G. Crisp '17, Rear Adm. Willard A. Kitts, 3rd, '22, Brig. Gen. Edgar E. Hume '21, Brig. Gen. Henry Hutchins, Jr., '21, and Brig. Gen. Lester D. Flory '30. There were 50 Alumni who had already been decorated.

Additions and corrections to the listings which have previously appeared, beginning with the issue of November, 1942, will continue to be published in future issues of The Review. As a matter of convenience, promotions and corrections in the rank previously given are grouped under a single heading, "Changes in Rank." The Review Editors are greatly indebted to the many Alumni and other readers who are continuing to co-operate so helpfully in reporting inevitable errors of omission and commission which they note in these listings.

NEW DECORATIONS

1911 Kenney, George C., *Lt. Gen.*, U.S.A., Distinguished Flying Cross — "For extraordinary achievement while participating in aerial flights in the execution of his duties as Commanding General of the Allied Air Forces, Southwest Pacific Theatre, and Commanding General of the Fifth Air Force." — Also awarded Knight Commander of the Order of the British Empire.

1921 Oster, Henry R., *Capt.*, U.S.N., Legion of Merit — "he achieved highly successful results on the overhaul, repair, and procurement of aircraft and aircraft material contributing essentially to the operations of aircraft units in the Pacific Fleet."

Wallin, Homer N., *Capt.*, U.S.N., Legion of Merit — no details.

1922 Johns, Dwight F., *Brig. Gen.*, U.S.A., Distinguished Service Medal — "For exceptionally meritorious service to the Government in a position of great responsibility in New Guinea from October 8, 1942 to April 16, 1943."

1923 Cowdrey, Roy T., *Capt.*, U.S.N., Legion of Merit — "planned and directed the salvage of numerous battle-damaged ships, despite adverse conditions."

1924 Reinhardt, George C., *Col.*, U.S.A., Legion of Merit — "For exceptionally meritorious conduct in the performance of outstanding service."

1933 Love, Robert M., *Col.*, U.S.A., Air Medal — "For meritorious achievement while participating in aerial flights between November 15, and December 23, 1942."

1936 Knight, Edmund C., *Capt.*, U.S.A., Soldier's Medal — "For heroism at Nashua, New Hampshire—August 19, 1943."

1939 Knoll, Denys W., *Comdr.*, U.S.N., Legion of Merit — "as fleet aerologist in the Philippines from November 5, 1941 to March 11, 1942, Comdr. Knoll merged the various weather services scattered over the Philippines, Netherlands East Indies, and Malaya . . . of inestimable value to the prosecution of the war in that area."

1941 Sieglaff, William B., *Comdr.*, U.S.N., Silver Star. No details.

1942 Bennett, Carter L., *Lt. Comdr.*, U.S.N., Gold Star in lieu of second Silver Star — "services as Commanding Officer, submarine war patrol, Japanese waters."

COMMENDATION

1921 ★ Healy, Howard R., *Lt. Comdr.*, U.S.N., posthumously awarded — "you maintained excellent control of damage by your direction and supervision of repair parties, displayed complete disregard for your personal safety during the battle, and returned the ship to an even keel and fighting condition, as a result of your devotion to duty and skillful direction of damage control, the loss of life was materially reduced." *U.S.S. Lexington*

NEW LISTINGS

U.S.A.

1910 Lewis, Richard W., *Lt. Col.*
1913 Portal, Robert T., *Lt.*
1919 Butler, James H., Jr., *Lt.*
Mayer, Albert, *Maj.*
1921 Blewer, Francis L., *Maj.*
1922 Bryden, Colby W., *Capt.*
Raffety, John S., *Maj.*
Smith, Roland L., *Maj.*
VanPelt, Eugene V., *Maj.*
1923 Hewett, George H., *Capt.*
1925 Stansfield, Robert S., *Capt.*
1927 Hately, F. Hall, *1st Lt.*
1928 Miller, Benjamin F., *Maj.*
Reiff, Stanley G., *Maj.*
Soukaras, Komnenus M., *Maj.*
1929 Fahey, John J., *Capt.*
Gray, Miles R., *Capt.*
Pistolas, Arthur N., *Capt.*
Stein, Enrico A., *1st Lt.*
1930 Ladd, Charles C., Jr., *Lt. Col.*
1931 Binning, Carl M., *Lt. Col.*
Boogher, Arnold, *Capt.*
Buchanan, Spencer J., *Capt.*
Cleveland, John M., *Pvt.*
Walker, Henry B., *1st Lt.*
1932 Bond, Leslie C., *Pvt.*
Danforth, Dirwood M., *Maj.*
1933 Brown, Stanley L., *Sgt.*
Bunshaft, Gordon, *Capt.*
Klein, Julian J., *1st Lt.*
Peterson, Edward C., *1st Lt.*
Wiley, John R., *Maj.*
1934 Farnum, Sayward H., *Maj.*
Gabrielson, A. Philip, *2nd Lt.*
Steinberg, Theodore, *1st Lt.*
1935 Haskins, Elizabeth M., *2nd Lt.*
Lowell, Anthony M., *Pvt.*
Rosengard, Arthur S., *Pvt.*
Zich, Arthur, *Lt.*
1936 Booth, Lance E., Jr., *Maj.*
Coberly, C. Wheeler, *2nd Lt.*
Prudente, William, *1st Lt.*
1937 Balch, Jackson M., *Capt.*
Bluestein, Robert A., *Pvt.*
Bourke, Jacob R., *Lt.*
MacDonald, Frank W., *Capt.*
1938 Binder, William V., *Capt.*
Cunningham, John D., Jr., *Pvt.*
Freedman, Robert W., *Pvt.*
Pape, F. William, Jr., *Pvt.*
Sherman, Louis M., *Capt.*
Simmons, William E., *1st Lt.*
1939 Dorsey, Herbert H., Jr., *1st Lt.*
Magnuson, Charles M., *Pvt.*
Powers, Edison, *Pvt.*
Woolford, Durbin A., *Capt.*
1940 Bucklin, Albert G., *Pvt.*
deCastro, Pedro A., *M. Sgt.*
Hazen, George W., *1st Lt.*
Hearon, William M., *Capt.*
Lippard, Frank W., *Pvt.*
Trent, Sumner E., *1st Lt.*
Vandersteel, William, *A.C.*
1941 Bourke, Roland J., *Maj.*
Hofmann, Henry W., *2nd Lt.*
Lalumia, Charles J., *2nd Lt.*
Pecevich, John, *Capt.*
Schwering, Robert M., *Pvt.*
1942 Anderson, Clarence S., *1st Lt.*
Aschaffenburg, Hans W., *Pvt.*
De Bevoise, John M., *1st Lt.*
Johnson, Warne P., *Lt.*
Marcuse, Adrian G., *1st Lt.*
Oakley, N. Bruce, *Corp.*
Patton, Robison B., Jr., *Capt.*
Van derKloot, Albert P., *Pvt.*
Wells, Jackson B., Jr., *Lt.*
1943 Bamford, Robert A., *Lt.*
Brooks, Paul, Jr., *Lt.*
Castanias, James E., *2nd Lt.*
Fortier, Ovide V., Jr., *2nd Lt.*
Kendziora, Carl A., *Pvt.*
Morrison, Eugene H., *2nd Lt.*
Mueller, Frederick E., *Lt.*
Smith, Frank S., Jr., *Pvt.*
Stern, Richard M., *Lt.*
Tilevitch, David, *2nd Lt.*

U.S.N.

1914 Smith, Paul R., *Comdr.*
1917 Hunt, Gilbert A., *Comdr.*
1918 Thorpe, Leslie A., *Lt. (j.g.)*
1919 Saunders, Edward E., *Comdr.*
1921 Crawford, Robert B. P., *Lt. Comdr.*
Hutchins, Henry A., *Lt. Comdr.*
1922 Donnelly, Richard E., *Lt.*
Johnson, Paul S., *Lt. Comdr.*
Marshall, Lawrence F., *Lt.*
Miller, William H., *Comdr.*
Paul, Frederick C., *M.M.1c*
1923 Rubins, Ralph E., *Lt.*
1929 Hutchinson, W. Spencer, Jr., *Lt. (j.g.)*
Whitney, Charles A., *Lt. (j.g.)*
1930 Bigsby, Vernon L., *Lt. Comdr.*
Brauer, Carl F., *Lt.*
Larkin, John C., *Lt.*
Westell, Joseph, Jr., *Lt. (j.g.)*
1931 Coonan, Fred L., *Comdr.*
Olsen, John L., Jr., *Lt. (j.g.)*
Redican, Thomas J., *Lt.*
Schweizer, David F., *Lt. (j.g.)*
Walker, Clifford C., *C.C.M.*
1932 Brown, Herbert H., *Lt. (j.g.)*
Carleton, Henry L., *Lt. (j.g.)*
Cavileer, Alfred, *M.M. 2c*
Coffey, Timothy P., *Lt. (j.g.)*
Leslie, John W., *Lt. (j.g.)*
1933 Cary, Gene, *Lt. (j.g.)*
Gammons, Robert T., *Lt. (j.g.)*
Hapgood, Cyrus S., *Lt.*
Hayden, Arthur S., *Lt. (j.g.)*
Simpson, Everett W., *M.M. 2c*
Sullivan, Eugene T., *Lt. (j.g.)*
Swanton, Walter F., *Lt. (j.g.)*
1934 Burke, John F., *Lt. (j.g.)*
Fisk, George T., *Ens.*
Henshaw, Jesse R., *Ens.*
Kopf, William F., *Lt.*
Scott, David C., Jr., *Lt.*
Welles, Richard H., *W.O.*
1935 Helwith, Edward E., *A.S.*
King, Arthur M., Jr., *Ens.*
LaRue, Daniel W., III, *Lt. (j.g.)*
Roth, Elmer J., *Lt. (j.g.)*
1936 Brooks, R. Max, *Lt. (j.g.)*
Cairns, C. Douglas, *Lt. (j.g.)*
Halloran, Richard, *Lt. (j.g.)*
1937 Hain, George M., *Ens.*
Moore, Walter B., *Lt. (j.g.)*
1938 Gambel, Adam C., *Ens.*
Moffatt, Wilder, *Ens.*
Muther, Richard, *Ens.*
1939 Bruno, Gilbert A., *Lt. (j.g.)*
Ferguson, Horace B., *Ens.*
Shoumatoff, Nicholas, *Ens.*
1940 Burnap, Clement F., *Lt. (j.g.)*
Copeland, M. Arnold, *Ens.*
Earl, Albert W., *Lt. (j.g.)*
Feldman, Joshua B., *Ens.*
Greenspon, Marshall E., *Ens.*
Yett, Frank A., *Lt. (j.g.)*
1941 Gould, Richard H., Jr., *Lt. (j.g.)*
Hartman, Alvin H., *Lt. (j.g.)*
Henry, Richard K., Jr., *Ens.*
Kisperth, Edwin G., *Ens.*
Manget, John V., *Ens.*
Pease, Marshall A., *Ens.*
Wickstrom, Carl A., *Lt. (j.g.)*
1942 Galle, Warren C., *Ens.*
Gleason, Fletcher, *Ens.*
Krauss, J. Edward, *Ens.*
Marsh, Arthur W., *Ens.*
Norris, Janet, *Ens.*
Owen, Richard C., *Ens.*
Ploss, Peter P., *Lt. (j.g.)*
Schmidt, John W., *Ens.*
Silva, John D., *Lt. (j.g.)*
1943 Brown, Donald H., *A.S.*
Ernst, Edward E., *S. 2c*
Gayton, John E., *Ens.*
Gratiot, John P., *Ens.*
Harris, Philip L., *Lt. (j.g.)*
Hurwich, Rudolph, *Ens.*
Libby, James W., *Ens.*
Rosenthal, Morris H., *Ens.*
Steinhauer, Henry, Jr., *Ens.*

U.S.C.G.

1936 Rosenfeld, George L., *Ens.*

U.S.M.C.

1927 Willcutt, Frederick W., *Capt.*
1930 Baldwin, Robert I., *1st Lt.*
1942 Foote, Earle G., *Lt.*
Taylor, John Y., *2nd Lt.*

CANADA

Army

1923 White, Gerald L., *Capt.*
1941 Lecavalier, Joseph E. M. F., *Pilot Off.*

CHANGES IN RANK

U.S.A.

1912 Fuller, Francis R., *Lt. Col.* to *Col.*
1915 Lacy, Clive W., *Maj.* to *Lt. Col.*
Mendelson, Ralph W., *Maj.* to *Lt. Col.*
1918 Kayser, Wendell H., *Maj.* to *Lt. Col.*
1920 Gelders, Joseph S., *S. Sgt.* to *T. Sgt.*
Rubin, Samuel, *Capt.* to *Lt. Col.*
1921 Hume, Edgar E., *Lt. Col.* to *Brig. Gen.*
Humphrey, Watts S., *Maj.* to *Lt. Col.*
Hutchings, Henry, Jr., *Col.* to *Brig. Gen.*
Kendall, Jackson W., *Maj.* to *Lt. Col.*
Reinhard, Herbert W., *Lt.* to *Capt.*
Richardson, Edward M., *Maj.* to *Lt. Col.*
1922 Brill, Clinton B. F., *Maj.* to *Lt. Col.*
Cunningham, Charles H., *Lt. Col.* to *Col.*
Freedman, Leo H., *Capt.* to *Maj.*
Kelly, David C., *Lt. Col.* to *Col.*
Madden, Kermit E., *Lt.* to *Capt.*
Maury, Dabney H., *Maj.* to *Lt. Col.*
Merriam, Kenneth G., *Maj.* to *Lt. Col.*
1923 Crowley, Harold G., *Capt.* to *Maj.*
Kerr, Horace J., *Corp.* to *Sgt.*
Ovenshine, Richard P., *Lt. Col.* to *Col.*
Southard, George H., *Capt.* to *Maj.*
Wilder, Philip S., *Capt.* to *Maj.*
Zane, John H., *1st Lt.* to *Capt.*
1924 Reinhardt, George C., *Maj.* to *Col.*
Zartarian, Sarkis M., *Lt. Col.* to *Col.*
1925 Gow, Ralph F., *Lt. Col.* to *Col.*
Gruber, Philip E., *Maj.* to *Lt. Col.*
Mabley, Carlton R., *Maj.* to *Lt. Col.*
Storie, Thomas D., *Lt.* to *Capt.*
1926 Deignan, John E., *Maj.* to *Lt. Col.*
Fireman, Martin M., *1st Lt.* to *Capt.*
Fuller, Arthur C., *Capt.* to *Maj.*
Lane, A. Howard, *Capt.* to *Maj.*
1927 Jacobs, Reginald F., *Maj.* to *Lt. Col.*
Johnson, Walter K., *2nd Lt.* to *1st Lt.*
1928 Briggs, Albert F., *Capt.* to *Maj.*
D'Espinosa, William J., *Maj.* to *Col.*

1928 Fournier, Norman L., *Capt.* to *Maj.*
Krummel, Robert L., *Capt.* to *Maj.*
McGuane, Frank L., *Capt.* to *Maj.*
Moore, David P., *1st Lt.* to *Capt.*
O'Hearn, Joseph A., *Capt.* to *Maj.*
White, Nathaniel, *Capt.* to *Maj.*
1929 Crandall, George A., *Capt.* to *Maj.*
Crosby, Henry S., *Capt.* to *Maj.*
McCaskey, John D., *Lt.* to *Capt.*
1930 Fleming, William D., *Lt. Col.* to *Col.*
Flory, Lester D., *Col.* to *Brig. Gen.*
1931 Boynton, Wyman P., *Capt.* to *Maj.*
Crotty, Francis C., *Maj.* to *Lt. Col.*
Eaton, Lewis G., *Lt.* to *Maj.*
Herbert, Donald L., *Lt.* to *Capt.*
Moore, Wiley T., *Capt.* to *Col.*
Robinson, William F., *Capt.* to *Maj.*
Westphalinger, Henry R., *Capt.* to *Lt. Col.*
1932 Baschnagel, Robert, *Capt.* to *Maj.*
Crowther, John F., *Capt.* to *Maj.*
Hoyle, Frederick B., Jr., *2nd Lt.* to *1st Lt.*
Ikuno, Frank M., *Lt.* to *Capt.*
Irwin, Joseph P., *Lt.* to *Capt.*
Isselhardt, Charles W., *Capt.* to *Maj.*
Lane, Thomas A., *Lt. Col.* to *Col.*
Lowery, G. Arthur, *Lt.* to *Capt.*
1933 Cullison, Charles E., *Pvt.* to *T. 4*
Hurd, John A., *Capt.* to *Maj.*
Kaplan, Jacob, *1st Lt.* to *Capt.*
MacMillan, Charles W., *Maj.* to *Lt. Col.*
Murphy, William D., *Maj.* to *Lt. Col.*
Neil, Donald R., *Lt. Col.* to *Col.*
Piskadlo, Matthew H., *Lt.* to *Maj.*
Raaen, John C., *Maj.* to *Col.*
Rowe, Richard S., *Lt.* to *Capt.*
Shaw, Walter A., *Maj.* to *Lt. Col.*
Skoog, Allan P., *Capt.* to *Maj.*
Stearns, Charles B., *Capt.* to *Maj.*
1934 Grosjean, Robert L., *Capt.* to *Maj.*
Heald, John M. D., *Capt.* to *Maj.*
Jacobson, Saul B., *Capt.* to *Maj.*
Jewett, Raymond B., *Capt.* to *Maj.*
Johnson, Frederick C., *Maj.* to *Lt. Col.*
Matthews, William S., Jr., *S. Sgt.* to *2nd Lt.*
Minotti, Aldo A., *Capt.* to *Maj.*
Moody, Robert L., *Lt.* to *Capt.*
Voyatzis, Polyvios A., *Lt.* to *Capt.*
1935 Dale, David W., *A.C.* to *2nd Lt.*
Deming, Arthur K., *Capt.* to *Maj.*
Gutleben, Donald C., *Lt.* to *Capt.*
Kurz, Philip F., *1st Lt.* to *Capt.*
Mills, Charles W., Jr., *Capt.* to *Lt. Col.*
Morse, Rollin D., *Lt.* to *Capt.*
Reece, George M., *Lt.* to *Capt.*
Stern, Julius, *Lt.* to *Capt.*
Thomas, Herbert C., *Maj.* to *Lt. Col.*
Wilson, Cornelius J., *Capt.* to *Maj.*
1936 Abbott, William E., *Lt.* to *Capt.*
Assmann, Frederick F., *Pvt.* to *2nd Lt.*
Brewer, H. Whitin, *2nd Lt.* to *1st Lt.*
Donnelly, George E., *2nd Lt.* to *Capt.*
Grossman, Eli A., *Sgt.* to *A.C.*
Kanters, Lawrence, *Maj.* to *Lt. Col.*
Merrill, Bushnell D., *Lt.* to *Capt.*
Stapler, John G., *Capt.* to *Maj.*
Varner, David E., *1st Lt.* to *Capt.*
1937 Agnew, James C., Jr., *Lt.* to *Capt.*
Fellouris, John H., *Lt.* to *Capt.*
Gaston, Dexter W., *1st Lt.* to *Capt.*
Neagle, Francis E., Jr., *Maj.* to *Lt. Col.*
Rockwell, Matthew L., *Lt.* to *Capt.*
Rosenbaum, Arthur H., *Sgt.* to *S. Sgt.*
Wemple, George B., *Capt.* to *Maj.*
1938 Brown, Staunton L., *Maj.* to *Lt. Col.*
Forman, Fred P., *Lt.* to *Capt.*
Hayward, Murray H., *T. Sgt.* to *M. Sgt.*
Homer, Horace H., *2nd Lt.* to *1st Lt.*
Senter, William O., *Lt.* to *Col.*
Strom, Atmore G., *Lt.* to *Capt.*
Thatcher, Lynn M., *Lt.* to *Capt.*
Wallach, Samuel, *P.F.C.* to *2nd Lt.*
1939 Brewster, William S., *Capt.* to *Maj.*
Cohen, Max, *Lt.* to *Capt.*
Griffin, Gus M., *Lt.* to *Capt.*
Guy C. William, *Capt.* to *Maj.*
Heroman, Lee C., Jr., *Lt.* to *Capt.*
Hess, Robert V., *Pvt.* to *S. Sgt.*
Jaffe, Herbert, *Pvt.* to *2nd Lt.*
Pearl, Eliot N., *1st Lt.* to *Capt.*
Snyder, Edward B., *Lt.* to *Capt.*
Steele, Winthrop M., *Capt.* to *Maj.*
Wexler, Harry, *Capt.* to *Maj.*
1940 Borg, Milton H., *Pvt.* to *A.C.*
Butman, Paul M., *Lt.* to *Maj.*
DeGuire, Merlin L., *Capt.* to *Lt. Col.*
Eckhardt, Douglas L., *Lt.* to *Capt.*
Forney, Gerard J., *Capt.* to *Lt. Col.*
Freedman, Hyman M., *Capt.* to *Maj.*
McEvoy, John P., *1st Lt.* to *Capt.*
Nash, Lloyd W., *Capt.* to *Maj.*
Nedell, Robert S., *Lt.* to *Capt.*
Radtke, Schrade F., *Lt.* to *Capt.*
Simpson, Willard E., Jr., *1st Lt.* to *Capt.*
Watts, Chester B., Jr., *2nd Lt.* to *1st Lt.*
1941 Baade, William H., *Pvt.* to *Sgt.*
Beard, Charles I., *Lt.* to *Capt.*
Berry, J. Raymond, Jr., *Lt.* to *Capt.*
Britt, Charles B., *Lt.* to *Capt.*
Dixon, Donald J., *Lt.* to *Capt.*
Downes, John A., *Sgt.* to *1st Lt.*
Fletcher, Joseph O., *Lt.* to *Maj.*
Fykse, Lewis D., *Lt.* to *Capt.*
Heist, John C., *Lt.* to *Capt.*
Holley, James J., *A.C.* to *2nd Lt.*
Howard, Donald A., *Capt.* to *Maj.*
Howell, Wallace E., *Capt.* to *Maj.*
Jarrow, Stanley L., *Lt.* to *Capt.*
Marcus, Mitchell J., *Lt.* to *Capt.*
Mitchell, A. Hoadley, *1st Lt.* to *Capt.*
Murdock, John B., *Capt.* to *Maj.*
Palmiter, Russell B., *1st Lt.* to *Capt.*
Rose, Grover D., Jr., *Lt.* to *Capt.*
Smolensky, Stanley M., *1st Lt.* to *Capt.*
Stadig, John E., *Lt.* to *Capt.*
Totten, George C., Jr., *A.C.* to *2nd Lt.*
1942 Anderson, Bruce H., *Lt.* to *Capt.*
Bush, Frank J., *1st Lt.* to *Capt.*
Cantlin, John H., *Lt.* to *Capt.*
Carpentier, Joseph H., *2nd Lt.* to *Capt.*
Charnowitz, Milton L., *2nd Lt.* to *Capt.*
Downing, Albert G., *2nd Lt.* to *1st Lt.*
Elmdahl, Ben A., *A.C.* to *2nd Lt.*
Fork, Donald W., *2nd Lt.* to *1st Lt.*
Gibson, Richard C., *Lt.* to *Capt.*
Given, Robert H., *1st Lt.* to *Capt.*
Hoxie, Howard M., *2nd Lt.* to *Capt.*
Kelly, Joseph B., *Cadet* to *2nd Lt.*
Lacey, Norman F., *2nd Lt.* to *Capt.*
McCutcheon, Howard S., *2nd Lt.* to *Capt.*
Mitchell, David B., *Pvt.* to *2nd Lt.*
Stein, Marvin N., *Pvt.* to *2nd Lt.*
Vetter, Edward O., *Lt.* to *Capt.*
Whelan, John L., Jr., *Lt.* to *Capt.*
Wilcox, William R., *2nd Lt.* to *Capt.*
Yamaschiro, George, *Pvt.* to *Corp.*
1943 Comey, Howard W., *O.C.* to *2nd Lt.*
Crocker, Gage H., *Cadet* to *2nd Lt.*
Fleming, Lamar, III, *A.C.* to *2nd Lt.*
Ford, Laurence M., *Pvt.* to *Corp.*
Hazzard, Stephen B., *2nd Lt.* to *Capt.*
Hendel, James N., *1st Lt.* to *Capt.*
Laird, William M., *Cadet* to *2nd Lt.*
Saunders, William G., *2nd Lt.* to *1st Lt.*
Sullivan, William J., Jr., *A.C.* to *2nd Lt.*

U.S.N.

1905 Nicholson, Dow H., *Lt. Comdr.* to *Comdr.*
1906 Fisher, Charles W., *Capt.* to *Rear Adm.*
1912 Grant, John S., *Lt. Comdr.* to *Comdr.*
1916 Larner, Harold, *Comdr.* to *Capt.*
1917 Crisp, Frederick G., *Capt.* to *Rear Adm.*
1918 Knox, Cornelius V., *Lt. Comdr.* to *Capt.*
1921 Oster, Henry R., *Comdr.* to *Capt.*
Wade, William C., *Comdr.* to *Capt.*
1922 Carlson, Milton O., *Comdr.* to *Capt.*
Kiernan, James E., *Comdr.* to *Capt.*
Kitts, Willard A., III, *Capt.* to *Rear Adm.*
1923 Bolster, Calvin M., *Comdr.* to *Capt.*
1924 Seddon, Robert S., *Lt.* to *Comdr.*
1925 Fletcher, Gilbert B., *Lt.* (*j.g.*) to *Lt.*
McCarthy, Edward O., *S. 1c* to *S.F. 2c*
1927 Craig, Edward C., *Lt. Comdr.* to *Capt.*
Forbes, James E., *Lt.* (*j.g.*) to *Lt.*
1928 Maguire, Charles J., *Comdr.* to *Capt.*
Roth, Richard, *Lt.* to *Lt. Comdr.*
Schade, Henry A., *Lt.* to *Capt.*
1929 Barnette, Stuart M., *Lt.* to *Lt. Comdr.*
Howell, John G., Jr., *Lt.* to *Lt. Comdr.*
1930 Buracker, William H., *Lt. Comdr.* to *Capt.*
Earl, Kenneth, *Comdr.* to *Capt.*
1931 Ekstrom, Clarence E., *Comdr.* to *Capt.*
Matthews, Francis D., *Lt.* (*j.g.*) to *Lt.*
Morse, Louis J., Jr., *Lt.* (*j.g.*) to *Lt.*
Ness, John M., *Lt.* (*j.g.*) to *Lt.*
Slack, Thoresby P., *Lt.* to *Lt. Comdr.*
1932 Fritz, Edmund B., *Lt.* (*j.g.*) to *Lt.*
Snyder, Philip W., *Lt.* to *Lt. Comdr.*
Tyburski, Leo T., *Lt.* (*j.g.*) to *Lt.*
1934 Farrin, James M., Jr., *Lt.* to *Comdr.*
Gouchoe, Richard L., *Lt.* (*j.g.*) to *Lt.*
1935 Glenn, James J., *Ens.* to *Lt.*
McKeon, John A., *Lt.* to *Lt. Comdr.*
Perkins, Robert E., *Lt. Comdr.* to *Comdr.*
1936 Knerr, Hugh S., *Lt.* to *Lt. Comdr.*
McKeever, J. Ross, *Lt.* (*j.g.*) to *Lt.*
Pettebone, Edgar R., *Lt.* (*j.g.*) to *Lt.*
Trescott, Charles E., *Lt. Comdr.* to *Comdr.*
1938 Benson, James F., *Lt. Comdr.* to *Comdr.*
Sargent, David L., *Ens.* to *Lt.* (*j.g.*)
1939 Andrews, Cornelius R., *Ens.* to *Lt.*
Cook, Arthur H., *Ens.* to *Lt.* (*j.g.*)
Knoll, Denys W., *Lt. Comdr.* to *Comdr.*
Sexauer, Benjamin H., *Lt.* (*j.g.*) to *Lt.*
Tilburne, Edward R., *Lt.* to *Lt. Comdr.*
West, John A., Jr., *Lt.* (*j.g.*) to *Lt.*
1940 Hayes, Thomas B., *Ens.* to *Lt.* (*j.g.*)
Higgins, John A., *Ens.* to *Lt.* (*j.g.*)
Hutzler, Richard H., *Ens.* to *Lt.* (*j.g.*)
Kyllonen, Tiovo V., *Ens.* to *Lt.*
McQuilkin, John H., *Lt.* to *Lt. Comdr.*
Tura, Louis B., *C.M. 3c* to *C.M. 2c*
Valentine, Kendall C., *Ens.* to *Lt.* (*j.g.*)
Wheelock, Philip S., *Ens.* to *Lt.* (*j.g.*)
1941 Brinckloe, William D., Jr., *Lt.* to *Lt. Comdr.*
Carroll, Daniel L., Jr., *Lt.* to *Comdr.*
Creighton, James A., Jr., *Ens.* to *Lt.*
Erlandson, Paul M., *Ens.* to *Lt.* (*j.g.*)
Gladding, Preston R., *Ens.* to *Lt.* (*j.g.*)
Grantham, Emery A., *Lt.* to *Lt. Comdr.*
Lazarus, Richard A., *Lt.* (*j.g.*) to *Lt.*
Ludwig, John W., *Lt.* (*j.g.*) to *Lt.*
Poskus, Alexander S., *Ens.* to *Lt.* (*j.g.*)
Schmidtman, Richard D., *Lt. Comdr.* to *Comdr.*
Sosnoski, Harry, *Lt. Comdr.* to *Comdr.*
Springer, Frank G., *Lt.* to *Lt. Comdr.*
Steere, Richard C., *Lt.* to *Comdr.*
Walsh, John W., *R.T. 2c* to *R.T. 1c*
Weedon, Daniel R., *Ens.* to *Lt.*
1942 Bunn, Robert H., *Ens.* to *Lt.* (*j.g.*)
Dodson, Charles O., Jr., *Ens.* to *Lt.* (*j.g.*)
Finger, John A., Jr., *Ens.* to *Lt.* (*j.g.*)
Fortune, William C., *Lt.* to *Lt. Comdr.*
Frost, Robert A., *Ens.* to *Lt.* (*j.g.*)
Gander, Frederick W., *Ens.* to *Lt.* (*j.g.*)
Garrett, Ralph W., *Ens.* to *Lt.* (*j.g.*)
Gore, Owen L., *Ens.* to *Lt.* (*j.g.*)
Hamilton, Henry L., *Ens.* to *Lt.* (*j.g.*)
Haviland, Winthrop A., Jr., *Ens.* to *Lt.* (*j.g.*)
Henderson, James H., Jr., *Ens.* to *Lt.* (*j.g.*)
Herman, William F., *Ens.* to *Lt.* (*j.g.*)
McGuire, Marshall J., *Ens.* to *Lt.* (*j.g.*)
McLaughlin, Henry E., *Ens.* to *Lt.*
Miller, John W., Jr., *Ens.* to *Lt.* (*j.g.*)
Moulton, Bernard W., *Mid.* to *Lt.* (*j.g.*)
Ring, Harold F., *Ens.* to *Lt.* (*j.g.*)
Robbins, Daniel, *Ens.* to *Lt.* (*j.g.*)
Seeley, Franklin P., *Ens.* to *Lt.*
Watters, George M., *Ens.* to *Lt.*
Weeks, Robert R., *R.M. 1c* to *C.R.M.*
Welch, Marion C., *M. 1c* to *A.S.*
Whitmore, Quentin R., *A.C.* to *Lt.* (*j.g.*)
Williams, Jack R., *Ens.* to *Lt.* (*j.g.*)
1943 Adams, Spencer M., *Lt.* to *Lt. Comdr.*
Brodie, Alvin C., *Ens.* to *A.C.*
Casserly, James R., *A.S.* to *Ens.*
Davis, Waldo F., Jr., *Mid.* to *Ens.*
duPont, Reynolds, *Q.M. 3c* to *Q.M. 2c*
Gallatin, Albert F., *Ens.* to *Lt.*
McMillin, John M., Jr., *Mid.* to *Ens.*
Meigs, Charles H., *Lt.* to *Lt. Comdr.*

U.S.C.G.

1923 Whitcombe, Stanwood E., *Cox.* to *B.M. 1c*
1934 Elliott, Royal A., *C.M. 2c* to *C.C.M.*
1941 Winslow, Edward B., *Cadet* to *Lt.*
1942 Oren, John B., *Lt.* to *Lt. Comdr.*

U.S.M.C.

1923 Buhler, August A., *1st Lt.* to *Capt.*
1927 Flagg, James D., *1st Lt.* to *Capt.*
1933 Brownell, Walter T., *Maj.* to *Lt. Col.*
1938 Bachmann, Louis, Jr., *2nd Lt.* to *1st Lt.*
Landen, J. Hains, *Corp.* to *1st Lt.*
1939 Demange, Robert C., *2nd Lt.* to *1st Lt.*
1940 Artz, John C., *2nd Lt.* to *1st Lt.*
1942 Conant, Frank R., *A.C.* to *2nd Lt.*
1943 Alexander, Cecil A., Jr., *Lt.* to *Capt.*
Bartlett, George W., *A.C.* to *2nd Lt.*

CANADA

Army

1941 Goldberg, Irwin, *Flight Officer* to *Flight Lt.*

RANK NOT PREVIOUSLY PUBLISHED

1934 Kimberly, James H., *Lt. Comdr.*, U.S.N.
1942 Curran, Hugh McC., *Lt.*, U.S.A.
1943 Karnuth, Arthur E., *2nd Lt.*, U.S.A.

CASUALTIES

1919 * MacKirdy, Howard S., *Col.*, U.S.A.
1936 * Waxman, M. Murray, *Lt.* (*j.g.*), U.S.N.
* Williams, Robert E., Jr., *Maj.*, U.S.A.
1941 * Ferguson, James H., *2d Lt.*, U.S.A.

★ Killed in Action. † Missing in Action. ‡ Prisoner of War. * Died in Service. ** Wounded.

TECHNOLOGY MEN IN ACTION

ALUMNI AND OFFICERS IN THE NEWS

Recognition

¶ For PER K. FROLICH '23, given a dinner in Newark on January 10 by the north Jersey section of the American Chemical Society on the occasion of his retirement as president of the society. Dr. Frolich was especially cited by Frank A. Howard, President of the Standard Oil Development Company, for "the production of a new type of large area fog or smoke screen generator, according to a new and ingenious concept, originating with Dr. Irving Langmuir of General Electric Co.; the production of improved incendiary bombs, and the development of new and more effective . . . flame throwers." Brigadier General Alden H. Waitt '14 said in the December Review that this smoke screen generator is "many times more effective than the early smoke oil-burners and . . . the best large-scale smoke producer ever developed."

¶ For FORREST F. LANGE '23, presented a $250 production award by Brigadier General G. H. Drewry, chief of the Springfield Ordnance District, for suggested improvement in the design of the bomb tail fuse, permitting a great saving in labor and material. The new method, immediately adopted by the Ordnance Department, became standard practice in the production of all 50-, 100-, 500-, 1,000-, and 2,000-pound bombs manufactured in this country.

¶ For W. ROBERT DRESSER '26, the subject of an article by Rocky Clark in the Bridgeport, Conn., *Post* of December 5, describing the various types of music now being supplied to Bridgeport industrial plants by his Audio-Tone Oscillator Company.

¶ For EDWARD McL. TITTMANN '29, featured in "a series of thumbnail sketches of men 'behind the gun' in mining, milling and smelting" by the Salt Lake City *Tribune* of November 21, which says: "The Garfield smelter of the American Smelting and Refining company has been a great proving ground for men and metallurgical methods. . . . To have men of Tittmann's age managing important smelters is significant. It . . . reflects great credit upon the older staff men who 'brought them along;' the latter being appreciated keenly by Tittmann . . . a metallurgical engineer who . . . through diligent use of training . . . plus a flair for making friends for himself and his employer, has reached his present position."

In the Journals

¶ By RALPH H. SWEETSER '92, "Anthracite Pig Iron," *Iron Age*, December 30.

¶ By ELIOT W. NILES '04, "Substitute Materials in Telephone Booths," *Bell Laboratories Record*, January.

¶ By CHARLES A. HOWARD '06, "Electrification for the American Republics," *Foreign Commerce Weekly*, November 13.

¶ By GREGORY M. DEXTER '08 and M. K. Newman, "Resonant Vibration in Large Engine Foundation," *General Radio Experimenter*, November.

¶ By VANNEVAR BUSH '16, "The Kilgore Bill," an open letter to Senator H. M. Kilgore on his mobilization of science bill, *Science*, December 31.

¶ By THOMAS R. CAMP '25 and P. CHARLES STEIN '40, "Velocity Gradients and Internal Work in Fluid Motion," *Journal* of the Boston Society of Civil Engineers, October.

¶ By ROBERT S. HARRIS '28, with ERNEST E. LOCKHART '34 and MARY K. NUTTER, staff, "The Chemical Composition of Depot Fats in Chickens and Turkeys," *Oil and Soap*, November (also presented before the division of biological chemistry at the 105th meeting of the American Chemical Society in Detroit); with HELEN S. LOCKHART, staff, and Dr. Samuel Kirkwood, "The Effect of Pregnancy and Puerperium on the Thiamine Status of Women," *American Journal of Obstetrics and Gynecology*, September.

¶ By LELAND E. GIBBS '31, "Manufacture of 20-Mm. Cartridges (Condition of Metal during Processing)," *Metal Progress*, November.

¶ By BERNARD S. GOULD '32, "Simple Adapters for Continuous Extraction of Aqueous Solutions in the Soxhlet Extractor," *Science*, December 17.

¶ By THOMAS B. RHINES '32, "Notes on the Selection and Installation of Aircraft Propellers," *Journal* of the Society of Automotive Engineers, November.

¶ By GEORGE A. FOWLES '34, "The Properties and Uses of Vinyl Resins for Wire and Cable," *Wire and Wire Products*, October.

¶ By EDWIN A. BOYAN '36, "Organization and Control of Mass Production," *Factory Management and Maintenance*, September.

¶ By ARTHUR A. BRIGHT, JR., and W. RUPERT MACLAURIN, both staff, "Economic Factors Influencing the Development and Introduction of the Fluorescent Lamp," *Journal of Political Economy*, October.

¶ By DUGALD C. JACKSON, staff emeritus, "Frank Julian Sprague, 1857–1934," *Scientific Monthly*, November.

¶ By KURT S. LION, staff, "Dosimetry and Local Distribution of Energy in the Electric High-Frequency Field," *Journal of Applied Physics*, October.

¶ By JOHN J. ROWLANDS, staff, "The Indian's Message," *Atlantic*, February.

Titles

¶ For LESTER D. GARDNER '98, elected chairman of the council and president of the aeronautical archives by the Institute of the Aeronautical Sciences.

¶ For PHILIP B. STANLEY '06, chosen president of the New Britain, Conn., General Hospital at the annual meeting on December 15.

¶ For JOHN C. KINNEAR '07, the first Nevada man elected to the board of directors of the American Institute of Mining and Metallurgical Engineers, to serve from February, 1944, to February, 1947.

¶ For REEVES J. NEWSOM '14, appointed village manager of Scarsdale, N.Y., taking office on March 1.

¶ For EDGAR ERSKINE HUME '21, brigadier general in the Army Medical Corps, named chief American health officer of the Allied Military Government of Occupied Territory in Sicily.

From the Platform

¶ FRANK B. JEWETT '03 and LEWIS W. WATERS '10 addressed the second war conference of the National Association of Manufacturers on December 10.

¶ GERALD F. LOUGHLIN '03 spoke on "Exploration for Mineral Reserves" on January 29 at the western mining war conference held in Denver as a joint meeting of the Colorado Mining Association and the western division of the American Mining Congress. On January 27 at the same affair CARL J. TRAUERMAN '07 and DENNIS F. HALEY '01 gave five-minute summaries of the problems and needs of the industry as applied to silver and molybdenum respectively. Mr. Trauerman quoted figures showing that twice the annual production of silver in the United States was currently being used.

¶ HAROLD V. O. COES '06, as president of the society, spoke on "Wartime Research and Development — A Molder of Engineering" before the 64th annual meeting of the American Society of Mechanical Engineers in New York.

On November 30 ALEXANDER KLEMIN '16 gave a paper on "Principles of Air Cargo Design." And on November 29, the opening day of the sessions, VANNEVAR BUSH '16 participated in a luncheon on "ingenuity."

¶ RALPH R. PATCH '06, lieutenant colonel, United States Army, addressed the war session of the American Pharmaceutical Manufacturers' Association held in New York on December 13 and 14.

¶ DEAN A. FALES '14 spoke on "Post War Automobile Design" before the southern New England section of the Society of Automotive Engineers at their December meeting in Hartford.

¶ CHARLES S. VENABLE '17 led a question-and-answer period on January 29 at the sixth winter meeting of the Industrial Research Institute in Rye, N.Y. On January 28 WILLIAM R. HAINSWORTH '21, chairman, on behalf of the institute, accepted the Klasson Medal of the Royal Swedish Institute from Professor Edy Velander, director.

¶ OTTO C. LORENZ '18 discussed government controls to combat inflation and possible methods of co-operation by the individual buyer at the monthly meeting of the Rochester branch of the American Association of University Women on January 10 in Rochester.

¶ PHILIP H. HATCH '21 spoke on "Diesel Electric Locomotives in Road Service" at a meeting of the New England Railroad Club on January 11 in Boston.

¶ LOUIS BERUBE '26 presented a report on the maritime fisheries problem of Quebec before the special committee on reconstruction and re-establishment in the Canadian House of Commons. The report is published in the Minutes of Proceedings and Evidence of this committee, No. 14, for May 20, 1943.

¶ RICHARD H. TINGEY '27 delivered a paper on "High Pressure Steam for Marine Propulsion" before the New England Association of Naval Architects and Marine Engineers, meeting at the Engineers Club in Boston on October 26.

¶ WALDEMAR I. BENDZ '28 gave an address on "Electronics in Industry" at a joint dinner session of the American Institute of Electrical Engineers and the Illuminating Engineering Society on December 7 in New Haven.

¶ ELSMERE J. WALTERS '30, colonel, United States Army, spoke for the Army on "Research and Development of Textile Fabrics for Victory" on December 3, Army and Navy night of the New York section of the American Association of Textile Chemists and Colorists.

¶ GORDON S. BROWN '31 was among the leaders of round-table discussion groups on January 19 at the annual meeting of the Army Ordnance Association in New York.

¶ MAX GENE NOHL '35 showed moving pictures in color on "Four Thousand Years of Diving" at the Richmond, Va., Woman's Club on January 17.

Off the Press

¶ By RIDSDALE ELLIS '09, *Coast Guard Law Enforcement*, Cornell Maritime Press.

¶ By FRANK L. AHERN '14, *Prevention and Control of Fire Losses, a Handbook*, Government Printing Office.

¶ By GEORGE C. MANNING '20, *Manual of Ship Construction*, Van Nostrand.

¶ By HORATIO L. BOND '23 and others (editors), *Training Manual for Auxiliary Firemen*, National Fire Protection Association.

¶ By CHARLES A. FELKER '29 and H. W. Paine, *Milling-Machine Index*, Bruce Publishing Company.

¶ By ROYCE G. KLOEFFLER '30, *Principles of Electronics*, Wiley.

DEATHS

** Mentioned in class notes.*

¶ FRANCIS C. HOLMAN '77, January 16.*

¶ FREDERICK W. WOOD '77, December 23.*

¶ YGNACIO BONILLAS '84, January 31. Ambassador from Mexico to the United States during World War I, Mr. Bonillas spent his early years in Tucson, Ariz., and after retiring from Mexican political life, returned to Tucson and Nogales where, the Arizona Daily *Star* says, he "maintained extensive mining activities" and was connected with "the Nogales, Sonora, water works." According to the *Star*, his candidacy for the presidency of Mexico in 1920 was balked by the assassination of President Carranza.

¶ JOSEPH E. HOLMES '84, September, 1942.

¶ GEORGE E. SYLVESTER '87, January 17.*

¶ FRANK I. CAPEN '88, December 30.*

¶ SAMUEL DAUCHY '88, November 19.

¶ THEODORE A. FOQUE '88, January 16.*

¶ ADELBERT F. MEAD '88, January 23.

¶ EDWARD M. SMITH '88, November 29.*

¶ ROLAND N. CUTTER '89, January 28.

¶ GEORGE B. LAUDER '89, January 16.

¶ FRANK HAYES '90, December 23.*

¶ EDWARD B. STEARNS '90, January 13.

¶ JAMES SWAN '91, February 9. An authority on ship construction and principal marine engineer of the Coast Guard, Mr. Swan helped establish the Course in Naval Architecture at the Institute. He was associated with the Newport News, the New York, and the New England Shipbuilding companies. From 1923 to 1927 he served as editor of *Marine Engineering*. His work for the government Bureau of Marine Inspection and Navigation led to his recent post with the Coast Guard.

¶ JAMES H. KELSEY '92, January 10.

¶ AUGUSTUS F. KNUDSEN '92, January 10.

¶ ROLAND BAILEY '94, May 29.*

¶ HENRY A. SWANTON '94, January 7.*

¶ MILTON L. FISH '95, November.*

¶ FREDERICK W. ANDREW '96, December 25.*

¶ FRANCIS M. CONANT '96, January 23.

¶ RALPH W. CROSBY '96, December 29.*

¶ MICHAEL V. LAHEY '96, August 3.*

¶ WILLIAM D. SMITH '96, December 16.*

¶ WILLETT A. WOOD '96, March 5, 1943.*

¶ FRANKLIN W. DOLIBER '97, January 11.

¶ STEPHEN M. HALL '00, July 6, 1942.*

¶ HOMER LITTLEFIELD '00, October 17.*

¶ EDWIN S. WORDEN '00, July 1.*

¶ GEORGE T. DE COLMESNIL '02, June 23.

¶ JOHN W. HOWARD '03, January 25.

¶ GEORGE W. SANBORN '04, January 13.

¶ WILLIAM A. CALDWELL '06, March 27, 1943.*

¶ DANIEL P. KELLEY '06, December 29.*

¶ ERLE F. WHITNEY '07, December 12.*

¶ BENJAMIN S. HIRSCHFELD '10, March 30, 1943.

¶ SYLVESTER SCHATTSCHNEIDER '12, July 2.*

¶ ANGELO B. M. CORRUBIA '13, September 9.

¶ MILES E. LANGLEY '13, January 19.

¶ GEORGE S. STEVENS '14, June 15.*

¶ WILLIAM A. BEVAN '21, July 5.*

¶ WILLIAM H. LEONORI, JR., '21, December 25.*

¶ MONTGOMERY KNIGHT '22, July 25 (see 1890 class notes).

¶ WILLIAM D. SCOFIELD '23, January 11.

¶ JOHN STORM '23, January 23.

¶ ALAN S. RENFREW '24, July 6.

¶ EMIL H. M. LEHNHARDT '25, October 31.

¶ EMIL O. MALMQUIST '28, September 27, 1942.*

¶ ARLEIGH T. BELL '30, June 30.*

¶ PAUL F. ECKSTORM '30, July 6.*

¶ HARRISON A. VON URFF '30, September 13.*

¶ WILLIAM F. WOOD '33, May 29, 1942.

¶ MILTON FREEDSON '37, September 10.

¶ FRED L. LAMB '38, November 8.*

¶ WILLIAM DUDLEY '42, February 3.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

A.S.C.E.

Sponsored by the Technology Club of New York, a luncheon for Alumni attending the annual meeting of the American Society of Civil Engineers was held at the Engineers' Club, New York, on January 20. The guests were welcomed by C. George Dandrow '22, President of the Technology Club of New York, who was introduced by William H. Mueser '22, chairman of the luncheon. Professor Charles B. Breed '97 presented Theodore B. Parker '11, Head of the Department of Civil and Sanitary Engineering at the Institute, who gave a brief but interesting talk.

Present at the luncheon were the following Alumni: Van Rensselaer Lansingh '98, Molybdenum Corporation, New York; Paul L. Price '00, American Institute of Steel Construction, New York; Paul Hansen '02, Greeley and Hansen, Chicago; George H. Shaw '04, Department of Agriculture, Washington; E. Sherman Chase '06, Metcalf and Eddy, Boston; Karl R. Kennison '08, Metropolitan District Water Supply Commission, Boston; Hale Sutherland '10, Lehigh University; Richard H. Gould, '11, Department of Public Works, New York City; William R. Glidden '12, Virginia Department of Highways, Richmond; M. Warren Cowles '15, Hackensack Water Company, New Milford, N.J.; George Harold Warfield '15, Coverdale and Colpitts, New York; Samuel M. Ellsworth '16, consulting engineer, Boston; Alfred T. Glassett '20, W. J. Barney Corporation, New York; Medwin Matthews '20, Board of Water Supply, New York City; and Lawrence M. Gentleman '22, Metropolitan District Water Supply Commission, Boston.

Also, Robert T. Colburn '23, Tennessee Valley Authority, Knoxville; William S. la Londe, Jr., '23, lieutenant commander, United States Navy; James M. Robbins '23, Newark College of Engineering; William S. Wise '23, State Water Commission, Hartford; James E. Jagger '24, American Society of Civil Engineers, New York; William L. Keplinger, Jr., '24, Johns-Manville Corporation, New York; Nathan Schooler '24, Flush Metal Partition Corporation, Long Island City; Edward S. Sheiry '24, Cooper Union; Edward Wininger '24, Nicholson Company, New York; Thomas R. Camp '25, M.I.T.; Milton G. Salzman '25, Ebasco Services, Inc., New York; William H. Latham '26, Department of Parks, New York City; Richard S. M. Lee '26, Waddell and Hardesty, New York City; Carl J. Bernhardt '28, Department of Health, Jamestown, N.Y.; Robert E. Crawford '28, Haller Engineering Associates, Inc., Cambridge; George P. Palo '28, Tennessee Valley Authority, Knoxville; Charles F. Parker, Jr., '30, W. H. Hinman, Inc., North Anson, Maine; Axel O. Bergholm '32, E. G. Budd Manufacturing Company, Philadelphia; Rolf Eliassen '32, major, Corps of Engineers; Philip C. Rutledge '33, Northwestern Technological Institute; John S. Bethel, Jr., '38, captain, Corps of Engineers; and Hugh F. Kennison '39, Lock Joint Pipe Company, East Orange, N.J.

Detroit Technology Association

The Association met on February 8 at the University Club to listen to a talk by Herbert W. Alden '93, chairman of the board of the Timken-Detroit Axle Company. His subject pertained to present tank design and development in relation to the design of tanks during World War I. Colonel Alden has had many years of experience on tank design, and he developed quite a few of the improvements on the tanks now being produced. — DOUGLAS B. MARTIN '25, *Secretary*, 6501 Harper Avenue, Detroit, Mich.

M.I.T. Club of South Florida

News of activities of the Miami Club has been made available to The Review by Ronald E. Shainin '42. At moderately spaced intervals the Club has been arranging dinner meetings for its members, with an unusual speaker as the principal attraction. A recent one was a dinner at the Towers at which Major Ralph Robart, commander of the orientation squadron at Miami Beach, told of the methods used to straighten out emotionally upset soldiers who couldn't adjust themselves to Army routine. Everyone agreed that he was an interesting speaker with a fascinating subject.

Clarence P. Thayer '23, Secretary, has been conscientiously putting out the monthly club paper, *News and Notes*, which is a collection of personal notes about the members.

The Club has recently been studying postwar employment possibilities, particularly those which will exist in southern Florida. Although the recent industrial growth in greater Miami is relatively small and entirely a war offspring, it seems as if air transportation would be the most active source of postwar employment in this area. Favorable prevailing weather conditions and an excellent geographic location give Miami decided natural advantages as a center of global aerial transportation. In addition, it is already keyed to the carrying out of ambitious commercial aviation plans with its manifold airports, equipment, and specialized personnel. — CLARENCE P. THAYER '23, *Secretary*, 4212 Northwest 6th Avenue, Miami, Fla.

Technology Club of New York

New members of the Club include Fred B. Cutter '98, electrical engineer, 50 Church Street, New York City; W. Joseph Littlefield '17, Johns-Manville Corporation, 22 East 40th Street, New York City; Richard O. Loengard '17, Vice-president, United Chromium, Inc., 51 East 42d Street, New York City; Frank W. Preston '25, New Haven Pulp and Board Company, 259 East Street, New Haven, Conn.; Gray Jensvold '37, Aluminum Container Corporation, Fulton, N.Y.

Activities at the Club during the past weeks have included the Class of 1917 dinner meeting on January 20, with Winfield I. McNeill as chairman; the Class of 1924 luncheon on January 26; and the annual get-together of the Club and the Technology members of the Technical Association of the Pulp and Paper Industry on February 15, when that organization was convening in New York. The Club likewise sponsored a successful luncheon meeting on January 20 during the sessions of the American Society of Civil Engineers. Details appear in column one of this page of The Review.

The Williams College group held an open house at the Club on January 15. It is anticipated that the Technology group will have a similar affair shortly, to acquaint our members with our completely refinished and refurnished clubhouse. — WILLIAM D. NEUBERG '17, *Secretary*, 24 East 39th Street, New York, N.Y. WILLIAM L. KEPLINGER, JR., '24, *Publicity Committee*, care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y.

M.I.T. Club of Northern New Jersey

About 150 members of the Club attended the smoker at the Newark Athletic Club on January 13, where we listened with keen interest to a talk on "The Future of Aviation" by Ralph S. Damon, Vice-president and General Manager of American Airlines, Inc. Mr. Damon's background of 16 years in airplane manufacturing and his recent service as president of Republic Aviation Corporation during the production of the P-47 (Thunderbolt) thoroughly qualified him to discuss this subject. He pictured a tremendous growth of commercial aviation on a world-wide basis after the war and described the future types of planes that we might expect. He also mentioned many technical improvements afforded by recent scientific research. Following the question period, we enjoyed the showing of a modern talking movie depicting how to fly a P-47. Refreshments were served during the social period, and members gathered in groups to enjoy good-fellowship.

Plans are being made for the spring party, which will be held in April or May. The usual notice will be mailed to members about two weeks in advance of the chosen date. — RALPH S. WETSTEN '21, *Secretary*, 87 Passaic Avenue, Summit, N.J.

Technology Club of Rochester

Rochester Alumni met with some of their successors at the Institute at the annual Christmas luncheon on December 30. Present were three civilian students, one ap-

prentice seaman, and twenty-seven of the Rochester membership. Homer D. Eckhardt '45 told about "Wartime Athletics" and convinced the Club that commercialism still has not the slightest foothold at Technology. Roger W. Patterson '44, speaking on "Activities and Social Life," surprised some of his listeners by saying that nearly all of the avocations which seemed so essential to students during more peaceful times are still making their contribution toward development of a well-rounded way of life.

"Graduate's Eye View" was the contribution of George A. Agoston, a graduate student in Course X, who was able to report on the more serious side of Institute activities. Robert F. Fauvre '46, visiting in Rochester for the holidays, completed the informal report on the status of Technology with an account of the Navy's V-12 program. His description of this new and different way of life held everyone's attention, and the club members noted that V-12 stands high on the Institute's list of accredited courses and that the sailors are just about as pleased to be attending M.I.T. in uniform as they would have been to come as civilians.

Biggest news of the luncheon was that on February 10 the Club would meet with James R. Killian, Jr., '26, Executive Vice-president of the Institute, for a firsthand discussion of Technology during and after the war. President Howard S. Gardner '30 announced the resignation of President-elect Ralph W. Peters '30, who left the district, and the election of David L. Babcock '33 as second vice-president.

Attending the luncheon were the following members of the Club: C. C. Culver '96, P. B. Wesson '98, A. F. Sulzer '01, J. F. Ancona '03, V. M. Palmer '03, M. H. Eisenhart '07, L. L. McGrady '17, H. R. Couch '20, E. S. Farrow '20, D. B. Kimball '20, C. K. Crofton '22, H. M. Shirey '22, H. H. Leary '23, E. H. Miller '23, A. L. Cobb '26, Lee McCanne '27, K. J. Mackenzie '28, H. S. Gardner '30, R. M. Wilson '30, C. F. Payne '33, R. E. Smith '33, J. A. Rodgers '35, F. J. Kolb, Jr., '38, A. K. Ackoff '39, R. H. Thompson '39, R. G. Talpey '41, and C. H. Alexander. — FREDERICK J. KOLB, JR., '38, *Secretary*, Building 14, Kodak Park, Rochester, N.Y.

Washington Society of the M.I.T.

At the January meeting, held on the 13th at the Y.W.C.A., we were scheduled to hear Frank P. Graham, a Vice-chairman of the War Labor Board and President of the University of North Carolina. Dr. Graham was sick and could neither attend our meeting nor a W.L.B. meeting scheduled for later in the evening. We were greatly indebted to Theodore W. Kheel, executive director of the War Labor Board, for pinch-hitting at the last minute.

Mr. Kheel said that the W.L.B., successor to the National Defense Mediation Board, was really different from other agencies in that it was tripartite, composed of membership from government, labor, and capital — all three really formulating the decisions. Its functions are to stabilize wages and settle labor disputes during the war. Its work was almost exclusively in the second category until October, 1942; since then it has been almost exclusively wage stabilization. Twelve regional boards are also tripartite, as are three-man panels set up to hear disputes and recommend to the boards. The decisions of the panels and boards are serving to define relations between capital and labor through day-to-day sessions in a way in which they never have been defined, and Mr. Kheel feels that the effect will carry over after the war. He gave a most successful talk and following it he answered many questions.

Included among the M.I.T. men who attended the talk and dinner were the following: 1889: G. W. Stone; 1890: J. G. Crane, W. B. Poland; 1897: P. L. Dougherty, H. M. Loomis; 1898: Martin Boyle; 1900: S. W. Jones, C. H. Stratton; 1902: A. H. Sawyer; 1903: W. L. Cook; 1904: M. L. Emerson, F. W. Milliken, G. N. Wheat; 1907: Allen Pope; 1908: P. H. Heimer; 1911: E. N. Fales, W. H. Martin; 1912: F. W. Barker, A. M. Pedersen, R. E. Wilson; 1913: L. W. Parsons; 1914: A. E. Hanson; 1917: J. P. Ferrall; 1919: A. H. Blake, L. J. Grayson, E. M. Kenison; 1920: John Nolen, Jr.; 1921: W. T. Smith; 1922: R. H. Blatter, H. H. Fisk, W. K. MacMahon, J. R. Morton, Jr., R. K. Thulman; 1923: F. J. Travers.

Others were: 1924: J. D. Fitch, C. E. Herrstrom, J. E. Jackson, R. P. Schreiber, W. W. Sturdy; 1926: S. J. Cole, T. L. Soo-Hoo; 1927: E. G. Cowen, M. D. James, G. C. Popps, R. M. Tucker; 1928: A. E. Beitzell, J. W. Gaffney, G. D. Mock, W. B. Moore; 1929: N. P. Stathis; 1930: A. F. Bird, J. R. Bloom, Mary Forsberg, J. A. Mathews, N. C. Nelson, F. W. Turnbull, G. P. Wadsworth, C. S. Wang; 1931: E. S. Worden, Jr.; 1932: J. T. Kelton, F. M. Moss, R. S. Prescott; 1933: C. W. Bohrer, L. R. Rickards; 1936: G. D. Mylchreest, E. R. Pettebone, 2d; 1937: G. B. Hunter, Jr., F. D. Lewis; 1938: J. G. Bryan, H. R. Seiwell, J. A. Wilson, Jr.; 1939: Charles Friedman; 1940: G. J. Forney, J. L. Lewis, R. W. McKinley; 1941: J. S. Sligar, K. C. Spengler. — FRANK W. MILLIKEN '04, *Secretary*, 613 North Greenwich Street, Falls Church, Va. WILLIAM K. MACMAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

CLASS NOTES

1877

We are sorry to report the deaths of two classmates: on January 16 at Carmel, Calif., Francis C. Holman, of whom we hope to have more particulars for a forthcoming issue; and on December 23 at Baltimore, Md., Frederick William Wood.

One of the most outstanding and gifted men of our Class, Wood was born in Lowell, Mass., and was educated in the public schools there until he entered Technology. He was graduated from Course III, Mining Engineering, and for a short time thereafter was an assistant to Professor Richards '68 in the mining laboratory.

In the fall of 1877 he received an offer from the Pennsylvania Steel Company. The following paragraphs are from his own hand: "On arriving in the early evening at the railroad station of Baldwin, now Steelton, near Harrisburg, Pa., my preceptor gave me a brief look-in at the steel works of the Pennsylvania Steel Company where I was to be employed. At that moment the superintendent of the company, its chief executive, happened to be passing by, and I was introduced as the young man who had come from the Institute to enter the open hearth. Glancing briefly at the newcomer, he said, 'Do you think you are going to be strong enough? You will find that the work will take muscle as well as brains.' This salutation was the only word I ever had from him in the three years I was in the open-hearth department (at $50 a month, without vacation), until I was called to his office and asked if I would like to take charge of the blast-furnace department. 'If you want to make the change you may do so,' he remarked; 'I'll let you alone, and you can work out your own salvation.' I was given free rein and after many headaches, had the department functioning respectably. Further departmental adjustments brought about advances in position to assistant superintendent, superintendent, general manager, and second vice-president."

In 1885 the steel company decided that it wanted a tidewater location where it could receive the large quantities of iron ore that came from Cuba. Wood was delegated to find an eligible site. He selected Sparrows Point, on the Patapsco River, a part of the port of Baltimore. Two blast furnaces were at once built. Within two years additional blast furnaces, a Bessemer steel plant, and rolling mills for the manufacture of steel rails and billets were constructed. To Wood's farsighted vision and business acumen may be laid the amazing growth at Sparrows Point, which developed from two blast furnaces into the only tidewater steel plant in the United States and now the largest one in the world. What more substantial monument could be desired by any man?

When this new plant was incorporated as the Maryland Steel Company, Wood was elected its president. After the Bethlehem Steel Company acquired the property, he became vice-president of the American International Shipbuilding Corporation, which was engaged in building urgently needed ships at Hog Island, Pa. At the end of World War I, he became a member of the claims commission of the United States Shipping Board and continued with it until the clearing up of the outstanding cases. Of late years Wood has been chairman of the board of the Eastern Rolling Mill Company.

During his active years in the steel business, he designed the first tilting open-hearth furnace, invented and put into operation the method of casting steel ingots on cars, the stripping devices universally used throughout the steel industry, and many other improvements valuable from physical and financial points of view. For these achievements he was deemed worthy of an entry in the "Encyclopaedia Britannica," eleventh edition, volume XIV, in the paragraph, "Car Casting," of the article on iron and steel.

Wood was a man of varied interests aside from his business activity. He was devoted to his family. His wife, who predeceased him by a few months, was a constant companion and source of inspiration. In January, 1943, they celebrated their 59th wedding anniversary. Wood owned a farm at Townsend, Mass., where

1877 Continued

he spent much of his leisure time and had occasion to make use of his skill and mechanical knowledge in repair work and improvements. Sailing was a hobby, and he owned a boat in which he and his family could make week-end cruises.

Throughout his life he maintained an extraordinary energy, mental as well as physical, and an eagerness for work and research. He was a trustee of Johns Hopkins University for 30 years, and a member of the executive committee for most of that time. He helped organize its engineering school and school of hygiene and public health. He was for 41 years a director of Consolidated Gas, Electric Light and Power Company of Baltimore, and of its predecessor. He was a term member of the M.I.T. Corporation from 1906 to 1911. With F. P. Fish, he had the first meeting with Richard C. Maclaurin which eventually led to the latter's election as president of Technology.

Our Class may justly feel proud of having had Wood as one of us. He was ever loyal to '77. Throughout his career he was noted for faithfulness to work at hand, for unassailable integrity, and for steadfastness of purpose. He is survived by six children, eight grandchildren, and one great-grandchild. — GEORGE W. KITTREDGE, *Secretary*, 592 North Broadway, Yonkers 3, N.Y.

1887

Arthur Nickels writes from 365 Fairbanks Avenue, Winter Park, Fla., where he is located for his fifth winter season in company with a friend from Boston. He says: "The cost of living has gone up here, and those who have only a limited income need to watch out. Walter H. Bunce '84 also spends the winter here. I knew him in Colorado. I should like any recent '87 news." — Herb Wilcox writes from South Pasadena, Calif., that his son-in-law, Paul Ward, who was with us at our 50th reunion in Marblehead in 1937 and is now a captain in the armed forces, made a brief stop with him recently en route to an unknown destination in the Pacific. — Rev. John Haskell Keep is now at 40 Second Street, Waterford, N.Y.

A Christmas card of unusual interest was that from our esteemed classmate, N. P. Ames Carter, in the form of his autobiography, one of 60 such sketches appearing weekly in the local Kiwanis leaflet. It certainly was most interesting and deserving of greater scope. Incidentally, your Secretary has been in receipt of numerous expressions of appreciation from recipients of our class greeting cards who are greatly pleased to be remembered year after year.

A tribute from a member of the Class of '88 is so touching and inspiring that your Secretary is moved to ignore all the laws of convention and include the same in these notes. He writes: "Dear Old Corporal: The 'old' is intended entirely as a term of affection, as it is plainly evident that no man can be considered really old who can think up and put into effect such a brand-new and bang-up friendly idea as your greeting card from the rare old Class of '87. I can assure you that at least one member of '88 very much appreciated the greetings and highly approved of the idea, even if he has been a little slow in saying so. He sends the Class of '87 and the corporal in particular his very best wishes for 1944 and all the years to come, and begs leave to identify himself as . . . Another Old Corporal."

The Secretary, be it known, was a corporal in Company C of the Cadet Corps in 1883–1884, the battalion being commanded by Frank L. Locke '86. As to the identity of Another Old Corporal — well, that is a matter for the consideration of the F.B.I. or possibly the Quiz Kids. In any event, he has won the heartfelt gratitude of the writer.

Another classmate, George E. Sylvester of Rockwood, Tenn., passed away on January 17 at the age of 79. Funeral services were held at the family homestead on High Street, Danvers, Mass., the Class being represented by Winthrop Cole, Ralph Curtis, and the Secretary. Most of Sylvester's life since graduation was spent in the South and Southwest, and up to his retirement some years ago he was chief mining inspector for the state of Tennessee. He leaves a widow. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Here is a letter from Charlie Faunce, our clambake furnace builder since our 35th at Duxbury in 1923. He was formerly a New Bedford whaler but has now retired to his fair haven near by: "You will notice that I have changed my address to 27 Church Street, Fairhaven, Mass., and am now living on the street that leads up to the tack factory. The town has changed considerably since 1910, although this section is about the same, except that there are several small boatbuilding yards along the water front. I have not heard from Reynolds since we went to Brookline to the class dinner, but I guess he is O.K. We certainly missed you at that dinner. It was a rainy day and we had to stay inside, but we had a very interesting time, for Webster gave us a good line on some of the amazing and almost unbelievable new inventions of today. . . . My grandsons like the Navy better than the Army: One is, or was, in Algiers the last time we heard from him; another is a PT boat inspector in New York; and the youngest (18) is in a camp at Bainbridge, Md., where he is first alternate for Annapolis. . . . I am doing some small work and appraisals on buildings and fire damage; so I keep busy about six hours a day — enough for an old duffer."

Louise Cromwell Baldwin, only daughter of James C. T. Baldwin, was married in January to René Numa Bourquin of Neuchâtel, Switzerland. The ceremony took place at the bride's home on Crafts Road, Chestnut Hill, Mass. The bride is a graduate of the May School and of Columbia University, and has been with the home service department of the American Red Cross in Brooklyn, N.Y. The groom is a graduate of the Ecole Normale of Fleurier, Switzerland, and has taught at the International College, Smyrna, Turkey, and worked for the Near East Relief Association and the International Red Cross. For 20 years he has been on the faculty of the Middlesex School, where he is now head of the French department.

Maurice B. Smith, son of Edward M. Smith, writes as follows regarding his father: "In the latter part of his life, especially, great pleasure and satisfaction were derived from his activities with his Class. The annual meetings were long anticipated and looked back upon with great pleasure. We who were close to him know that 'no better man ever lived,' and it meant a great deal to my mother, my sister, and myself to have you say so. . . ."

Frank Irving Capen of 31 Walnut Avenue, Stoughton, Mass., died on December 30. Capen was a regular student in Course III with us in the fall of 1884. In our "Class Record of '88" published in 1924, William G. Snow, former Secretary, said: "Capen took courses with the Class of '88 and has been present at its gatherings since graduation, although catalogued as of the Class of '89. . . . In 1923 Capen wrote: Took courses in Course III with '88 and Course I with '89. Was with the Metropolitan Water and Sewerage Board as Division Engineer until 1912. Since 1912 I have been associated with C. H. Goldthwaite of Brockton and Taunton in the management of drug business and real estate. Am at present also a member of the Board of Selectmen of town of Stoughton. His daughter Ruth graduated from Smith."

Our Class has lost one of its most active and lovable members, Ted Foque, who died on January 16 at his home at Northome Beach, Wayzata, Minn. He belonged to the famous triumvirate of Ellis, Foque, and Eastman. During their four years at the Institute, if you saw one of them, the other two were near by. They were in the same section and Course (II) throughout. They lived and studied together.

Foque entered the service of the Minneapolis, St. Paul and Sault Ste Marie Railway Company as draftsman on August 20, 1888. About a year later he was made chief draftsman and continued in that position until October, 1893, when he was appointed engineer of tests. During that time he had charge of all the drafting and mechanical engineering work. In October, 1894, he was appointed assistant mechanical superintendent, with the usual duties pertaining to the supervision of motive power, machinery, and rolling stock. In 1901 he became mechanical superintendent. He was a member of the American Society of Mechanical Engineers, the Technology Association of Minnesota, the Minneapolis Club, the Minikahda Club, the Lafayette Club, the Minneapolis Automobile Club, and the Western Railway Club. He was also a director of the Midland Lumber and Coal Company, Minneapolis. Ted came all the way from Minnesota to one of Ned Webster's class dinners in 1936 and came back again to our "grand 50th" at Marblehead in 1938, when he was one of the long-distance champions. He will be sadly missed at our future gatherings.

Sanford Thompson went to Florida for the month of January and ought to have some interesting news for us on his return. We hope that he did not linger in the hot sunshine too long, as your Secretary did last March. — BERTRAND R. T. COLLINS, *Secretary*, 39 Wiggins Street, Princeton, N.J., SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston 15, Mass.

1890

Harry Noyes wrote in December: "I am sorry to say that I have not been up on my pins since June. About the middle of June, I went fishing in the Gatineau region

1890 Continued

of Canada and had to be carried home on a litter. There was no accident — I simply had a stroke and have not been able to write much since. Mrs. Noyes and my daughter were able to get me home to Niagara Falls, where I have been under good care. You asked whether I have been doing anything in connection with war work, and I am obliged to say that I have not, except giving a son to the armed forces and doing my part in the manufacture of ferrosilicon and carbide." Our sympathy to Harry: but congratulations on his good spirit, which, knowing him as we do, we should all expect.

The Class will be glad to have news from Franklin Knight, who writes that he and Mrs. Knight are spending the winter with his daughter-in-law and her three children in Atlanta, Ga. (3529 Ivy Road). They are in Atlanta because of the sudden death last July of their oldest son, Montgomery Knight '22. Professor Knight was a prominent aeronautical engineer and since 1930 had been director of the Daniel Guggenheim aeronautical school at Georgia Tech. His death is a great loss and our deepest sympathy goes to Franklin, Mrs. Knight, and Professor Knight's family. Franklin's other two sons are doing important war work, one as safety inspector of the Bell Aircraft Corporation, looking after the safety of some 30,000 men and women, and the other as dispatch director of the specialties department of the General Electric Company at Pittsfield, Mass. Knight writes further:

"Excepting for a twinge of rheumatism now and again, I can almost report myself at 75 like Moses, of whom it was said at his death, 'his eye was not dim, nor his natural force abated.' On July 1, 1937, after 26 years as rector of St. Paul's Episcopal Church, Holyoke, Mass., I retired on the moderate pension which my church provides.

"I now live in Great Barrington as a very modest dirt farmer and self-maintaining householder, on call by my church and her clergy for service as 'supply minister' during short vacancies, in case of sickness, or at time of vacations. These duties occupy about one-third of the Sundays in the year, besides special occasions. . . ."

Harry Burley, whose doctor, we very much regret to report, has recommended that he cut down his duties, decided that Goodwin's long and active connection with the Institute made him the logical successor as '90's representative on the Alumni Council, and Burley has prevailed on Goodwin to take his place.

Frank Hayes, "one of the oldest and most prominent pioneer residents of Superior, Wisconsin," died on December 23. He spent a year at the University of Minnesota before coming to Technology. In 1897, he started the Superior Iron Works, which he owned and operated successfully until 1920, when a serious illness made it necessary for him to retire. He was obviously public spirited; the Superior *Telegram* states that he had been president of the Superior Board of Vocational and Adult Education, secretary of the Superior Commercial Club, secretary of the Duluth Engineers Club, senior warden of the Episcopal Church, and secretary of the Technology Club of Lake Superior. With his wife, he had been actively interested in carrying on an extensive reforestation project. She survives him, as do a daughter and a son, who are both in defense work.

We have received the following interesting news from Frank M. Greenlaw. After his retirement in 1940, he and Mrs. Greenlaw enjoyed an extended trip through the Canadian Rockies to California, returning by way of Panama, Mexico, and Havana. "When war came to us," he writes, "I went into civilian defense in Newport. I attended a course at Amherst in the spring of 1942 and qualified as a lecturer to give basic courses to air-raid wardens. I specialized in chemical warfare agents, their effects and means of protection against them, and I organized an active decontamination unit. Since October 1, 1942, with the exception of a month at home last June, I have been in Providence in the department of physics at Brown, giving instruction in general physics to premeteorology students in the Army Air Forces and to Navy V-12's. So I feel that I have been contributing in a small way to the war effort, and plan to continue here until the end of the spring semester in June, when I shall retire again — this time permanently, I expect. . . ."

The address of William P. Flint has been changed from Orlando, Fla., to Box 3935, St. Petersburg. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston 9, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-242, M.I.T., Cambridge 39, Mass.

1894

The first class letter sent out relative to our 50th reunion in June has brought in some interesting replies and, thus far, a general approval of the tentative plan suggested by Tenney, Claflin, and the Secretary as a self-appointed local committee. A few of the replies are from men who have been rather quiet or too busy to write in years past, and their response is most heartening to the Secretary.

Frank S. Howland of Athens, N.Y., head of Howland and Son, is doubtful whether he can join us in June at the reunion as he is now alone in the business in which he has long been engaged. His son, Warren E. '22, who is associate professor of sanitary engineering at Purdue University, is well remembered by the Secretary as a former student. — W. H. King is a partner in the law firm of King, Frank and Whyman, 51 Chambers Street, New York. King has long been a specialist in taxation and if, at the reunion, he can clarify for us the present Federal income tax return, we shall recognize him as a real expert. He suggests some form of memorial from the Class to M.I.T., a suggestion of which many will no doubt approve.

H. O. Lacount says he is "retired," but we all know that means he is busy as ever doing good works without pay. The Secretary knows! — C. G. French will be with us, after an absence and almost complete silence of more than 50 years — he did not stay the four undergraduate years. Following a successful career as landscape architect in Utica, N.Y. (430 French Road), he is now "retired." We shall be glad to see him. — Leslie Dana thinks '94 was looking old 25 years ago. That was because we all were serious and hard working. If he will come, we will demonstrate to him that even though past threescore and ten, we are not all decrepit. Leslie has retired but still plays tennis and badminton, showing that age has no terrors for him. His address is 1 Brentmoor Park, St. Louis. — George Owen is "in service" teacher with Gibbs and Cox, New York naval architects. George still makes his home at 19 Glen Road, Newton Center, and commutes weekly to and from New York. He proposes that classmates attending the reunion have use of the Technology sailing boats on the Charles River if they desire. He will be glad to be sailing master, and as he designed some or all the dinghies, he knows how to handle them.

Joe Thropp is junior manufacturing engineer with Fairchild Aircraft. His address is Hotel Alexander, Hagerstown, Md. Joe and his wife will be with us. — Arthur Tidd will be another who will get a warm welcome, as he has not been able to meet with the Class in our earlier five-year reunions, his work having apparently been his chief activity. He lives at White Plains, N.Y. We hope he can induce Fred Stearns and Franklin Robbins to come along, too. Stearns lives at 34 Overton Road, Scarsdale, N.Y., and admits that he is retired. — Leslie Moore, after many busy years with the Massachusetts Department of Public Utilities, is another who has retired. He resides in Concord, the home of philosophers. He will be with us in June, as will C. G. Abbot, still Secretary of the Smithsonian Institution at Washington, one of our most scientific scientists.

Earl Jenckes is president of the Fairy Silk Mills, Inc., Shillington, Pa. Earl counts on being with us, as he has had to miss the two previous reunions. — We are happy to have a positive reply from A. F. Hunt, Jr., whom we have long missed. Hunt lives at Mount Holly Springs, Pa. — Luther Nash says that he is "largely retired" and that his address is 155 Main Street, Ridgefield, Conn. He will explain in June. — Henry Copeland is still with L. Sonneborn Sons, Inc., and lives at 170 East 79th Street, New York. He indicates that he will be with us in June, after a lapse of many years.

The foregoing names are of men whom we all remember pleasantly. The fact that most of them will be here for our reunion will undoubtedly stimulate action on the part of their friends of long ago. Send in your replies, boys.

Not all our replies are so happy in their effect on us. We record with sorrow the death of Roland Bailey of Kingston, Mass., on May 29. Bailey spent three years with us as a student in Mechanical Engineering. For several years previous to his demise he was in charge of the town business and a leading citizen of Kingston. His widow survives him. Those who were at our 45th will remember with pleasure his affable and friendly manner and his evident enjoyment in meeting friends of long ago.

More recently has come the news of the death on January 7 of Henry A. Swanton, a man of remarkable character and indomitable courage. As the result of an early injury, Swanton was very lame during his student years, and this lameness debarred him from many lines of active work in engineering. His professional activities were thus limited largely to designing and drafting-room work. Becoming more and more incapacitated, he retired to Westport, Maine, where he ran a large market garden

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for the summer trade. His physical disability never soured his disposition and, though much alone, he lived patiently, cheerfully, and always helpfully to those who came in contact with him. He read widely, and wrote occasional verse of thoughtful nature.

A pleasant note from Mrs. Elizabeth S. Watson (Mrs. Thomas A.) from Pass-a-Grille, Fla., expresses her inability to attend the reunion. It may be remembered that her husband was one of the early and very important men in the development of the telephone. (See the article by M. L. Emerson '04 in the January Review.) Watson, like his wife, was a special student in our Class although much older than the rest of us. His autobiography appeared several years ago.

The Secretary is proud to be the recipient of two honors — election as chairman of the board of directors for the Refrigeration Research Foundation, Inc., and the emblem for civilian service authorized in October, for six consecutive months of satisfactory service with the War Department. — SAMUEL C. PRESCOTT, *Secretary*, Room 3-233, M.I.T., Cambridge 39, Mass.

1895

Surely there is a reason why some of our classmates do not remember their Class Secretary more frequently. It must be that their connections with the war effort prohibit any dissemination of news lest it be of military value and a comfort to the enemy. To our sorrow we do learn of the passing of our mates, one by one. Bad news travels faster than good news. A letter from Mrs. Alfred E. Zapf, who has been living in Freeport, Ill., since the death of her husband, says that Milton Fish died in November in Pasadena, Calif., and that Mrs. Fish followed him on January 8.

Milton Lathrop Fish, VI, lived to be 76 years of age. In 1895 he started work as assistant manager of the Pasadena Electric Light and Power Company. From this work he went for a second year of experience to the Nordyke and Marmon Company of Indianapolis. Originally from New York State but compelled by ill-health to leave the engineering profession and seek the milder climate of California, he spent several years in the Middle West and San Francisco. From 1898 to 1909 he was connected with the Thomas Foulke Electrical Contractors of Los Angeles. In 1910 he worked for the Essex Construction Company, railroad contractors. In 1911 he established the Buffalo Sheet Metal Works, Inc., ventilating engineers and sheet metal contractors, in Pasadena. This business was carried on for more than 20 years. Fish was a stanch supporter of the Institute and of his Class, but like many others who are located a long distance from Boston, he regretted not being able to attend the class activities, generally held near Boston. He is survived by two sons: Milford C. Fish, a lieutenant in the United States Marine Corps, serving in the South Pacific area, and Thomas L. Fish of Pasadena; also by a brother and two sisters. He was a member of the First Baptist Church and the Ambassador Bible Class.

Your Secretary cherishes the memory of a most pleasant visit with Fish and Zapf during the summer of 1927 while touring the western states, Canada, and Alaska. We held a unique three-man reunion — Fish, Yoder, and Zapf. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

1896

The last day of the old year was not one of entire happiness because on that day, in the afternoon, Joe Harrington called at the Secretary's office. The Institute had closed at noon on that Friday to give everyone a chance to prepare for New Year's Day, and consequently the Secretary missed seeing Joe and had only the card which he left, bearing the notation "Happy New Year." The Christmas season brought holiday greetings to the Secretary from several members of the Class, including Allen, Bakenhus, Hersey, Jacobs, Lythgoe, Laws, Rutherford, Rockwell, Sager, Tilley, Tucker, and Wayne.

Professor Elbridge Churchill Jacobs, geologist at the University of Vermont, who is a charter member of the American Association of University Professors, has been nominated as a candidate for the council of that organization from District 1.

The very latest word regarding the Fullers is a clipping from the Brockton *Enterprise* of January 12 telling of the death of Mrs. Fuller at Rockport, Texas, after an illness of but a day. This makes a very sad termination of their sojourn in Texas, and the sympathy of the entire Class goes out to Myron.

Elizabeth P. Hamlen has changed her abode to 46 Mount Vernon Street, Boston. Albert C. Smith, who has been connected with the Walworth English Flett Company in Boston for many years, has now retired to Kingston, Pa. Bakenhus reports that at the annual dinner of the American Society of Mechanical Engineers in New York in December, he had a short talk with Sam Hunt of Manchester, N.H. Bakenhus also said that he frequently sees Trout, who still continues hale and hearty. He likewise has more or less frequent contacts with Tilley and Sager.

The college press service of the General Electric Company in Schenectady has released a press notice regarding the retirement of Walter Stearns on January 1, after 39 years of service, and giving a story of Walter's career with the company from the time he entered the service of the Fort Wayne Electric Works in 1904 down to his last position as manager of trade relations and special contracts.

It is a great relief to have 1943 behind us, as the year took a heavy toll from our ranks. In the month of December alone word was received of two deaths which had occurred earlier in the year, and of three more which had occurred in the last half of December.

Willett A. Wood died on March 5, 1943. He was graduated in Electrical Engineering and followed that profession in Detroit, but for a long time he had been incapacitated and an invalid confined to his bed.

Michael V. Lahey died on August 3 in St. Louis, where he had followed the occupation of architecture. He was with our Class for only one year as a special student in Course IV.

William D. Smith died in London, Ontario, on December 16, at the age of 78. He was a student in Mechanical Engineering with us for two years, and he followed engineering work with various companies in the United States, but retired some years ago to his native heath in Canada and had been living quietly near London.

Frederick W. Andrew died on Christmas Day. He was with us only in our freshman year. He had a notable career in the electrical industry in the employ of Westinghouse and other companies, and more recently as an independent consulting engineer, living in Glen Head, Long Island. He had been granted numerous patents along electrical and other lines.

Ralph W. Crosby passed away in Osterville, Mass., on December 29, after a short illness of influenza pneumonia. For a while after graduation he was with the Newport News Shipbuilding and Dry Dock Company, and then he returned to Osterville, where for about 20 years he was with Daniel Crosby and Son, yacht builders. In recent years he carried on a profitable insurance business. Buster was the first one to appear at our reunions and the last one to leave, and we felt that as a typical long-lived Cape Codder he would be among the final survivors of the Class. We certainly shall miss him. — CHARLES E LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1898

After 43 years of service, John H. Larrabee, head engineer of the United States Navy Hydrographic Office, retired in December. During the brief ceremony signalizing his retirement at his office in Suitland, Md., official letters of commendation were read from Secretary of Navy Frank Knox, Admiral Ernest J. King, and Rear Admiral G. S. Bryan.

Secretary Knox wrote: "When we or our Allies called for charts, you had them. When we sought information concerning small, almost forgotten islands in the South Pacific, the Aleutians, Iceland, Greenland, and the Far North, you promptly supplied it."

Admiral King recalled the time he and Mr. Larrabee spent together aboard the U.S.S. *Eagle*, when Mr. Larrabee, as hydrographic surveyor, was engaged in charting the coast of Cuba. Admiral King's letter stated: "The real importance of your work and its true value to the commanding officers of our Navy and Air Forces, are fully appreciated, for, lacking accurate charts, this fight cannot go on to victory."

Rear Admiral Bryan's letter stated: "I have always felt that I could rely on your loyal co-operation and splendid judgment in any task that presented itself and that you always had the best interests of the office in mind."

The Navy press release announcing the retirement made special mention of the fact that Larrabee, as co-inventor of the Pantograver, an instrument of precision used in the compilation and engraving of nautical charts, has revolutionized the science of chart making. Continuing, the release said: "Among the capacities in which he has served are as hydrographic surveyor on one of the United States naval survey expeditions to Cuba, Hispaniola, and Panama; as chief of lithographic reproduction during the first World War; and as principal engineer, division of chart construction. Dur-

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ing his connection with the Hydrographic Office, it has grown from a relatively small organization having on issue about 1,300 charts with an annual output of 6,000 copies, to an establishment issuing 5,000 nautical and navigation charts covering the entire world and with an annual output of more than 40,000,000 copies. He holds the Second Medal of Wen Hu, conferred upon him by the government of China for his help to the Chinese hydrographic mission in 1925 and 1926."

After his graduation from Technology, Larrabee served as junior engineer with the War Department until appointed to the Hydrographic Office in 1901. A native of Boston, he lives at 5908 Cleveland Avenue, Riverdale, Md. — ARTHUR A. BLANCHARD, *Secretary*, Room 6-421, M.I.T., Cambridge 39, Mass.

1900

It was thoughtful of the Cranberry King Crowell down on the Cape to send in a box of his favorites. It brings vividly to mind the excellent cocktail he prepared at the last reunion.

Professor Bugbee is at home again, having finished his tour of duty with the Bureau of Mines. He had received a letter from Tweedy, part of which follows: "My son, George A. Tweedy, Jr., after being graduated in mining engineering from the Mackay school of mines at the University of Nevada, enlisted in the Marines. He has received his commission and is being sent to Technology to take a course on detection instruments. . . . I am enjoying the best of health and my work here as supervising engineer in the Reconstruction Finance Corporation. . . ."

Homer Littlefield died on October 17 at his home at Columbus, Ohio. He was formerly manager of the coal mining division of the Marion Steam Shovel Company. — Word has also come of the death on July 1 of Edwin S. Worden, II, formerly with the New York Telephone Company, and of that of Stephen M. Hall, VI, President of Stephen Hall and Company, Inc.

The Rochester, N.Y., *Democrat and Chronicle* of November 3 carried the following story: "Feted by more than 65 fellow-employees, Edwin W. Hammond announced his retirement as Division Engineer of the B. & O. Railroad at a dinner party . . . in Hotel Rochester. . . . He was presented with a cash gift, and a collection of classical phonograph records. . . . Mrs. Hammond, who was presented 41 roses, one for each year of her husband's service, will accompany her husband on a trip to New York City. They expect to spend the winter months in Florida."

Blair, who has been doing a wonderful job getting the New York boys together, writes: "I am glad to report that we have had our little class luncheon for the New York district and decided that we would do it again. Present were Atwood, Chalmers, Davis, Johnson, Price, Tuck, and Smith. Jouett, who had expected to attend but was ill, and three or four others, including Leonard, said that if we had another luncheon and they were in town, they would be glad to join us."

A nice letter from Charlie Smith tells of the good time he had at Blair's luncheon. A part of his letter follows: "After C. E., Jr., '46 completed his first term at M.I.T., with honors, he was taken by the Army, and after passing through Camp Devens, Amherst, Atlantic City, and the University of Michigan, is now at Chanute Field, Rantoul, Ill., studying in the weather services of the Air Forces." — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston 9, Mass.

1905

G. W. C. Whiting, I, comes out of seclusion to tell us that his oldest son is a second lieutenant in the Army, is married, and has no children. Another son is a farmer, married, with one child. One daughter, married to a doctor now serving in the Navy, has a daughter and one son. If our mathematics is correct, George is eligible for the grandfathers' club three times. He still "runs" the Whiting-Turner Contracting Company (heavy contracting), National Marine Bank Building, Baltimore, Md. — Ray Bell, II, writes that having gotten the War Department and the War Production Board in Washington properly "liaisoned," he has returned to his former practice of management engineering, with offices at 726 Jackson Place, Northwest, Washington, D.C.

John C. Damon, VI, was retired from the Army last August with the rank of colonel and is now living at 444 Farmington Avenue, Hartford, Conn. He has joined the staff of the Hartford Electric Light Company. Frank DeW. Webster, II, now in California on a vacation forced by his physician, writes of being snowbound for several hours in a car detached from a train in the northern Californian mountains. What's the matter with this California climate? Our correspondents seem to be giving it a black eye. Frank is stopping a few months at 206W Santa Clara, Santa Ana, Calif.

Every time we make a mistake in reporting news from the Fisher family, we swear never to mention them again. In the January issue we announced Anne Fisher's engagement. Only two mistakes: It was Edith, not Anne, and she was married on December 19 to William Armstrong Hunter, 3d, son of Dr. and Mrs. Stanley Hunter of Berkeley, Calif. The ceremony took place at the James Memorial Chapel, Union Theological Seminary, New York City, where Edith was (and is) a student. According to Andy, it was a grand occasion, and he'll tell you all about it at the next reunion. Another bit of Fisher family news must be authentic because Andy telephoned it in. Andrew Fisher, 4th, was born at Richmond, Va., on January 15. Andy, 3d, is a corporal in the Army, at Camp Pickett, Va.

The new address for Sam Shapira, III, is 23 State Street, Framingham Center, Mass., where he was transferred from Camp Devens last May. Sam has been with the area engineer at the Cushing General Hospital, a 1,727-bed hospital in Framingham. Sam's son Norman '41 is a major in the Army. — Bill Green, VI, is teaching at Putney School, Putney, Vt.

Walter S. Brown, III, gives us a concise life history as follows: "Present job — bank president; children — none; hobbies — photography, woodworking, and watch and clock repairing." The latter could be quite remunerative right now. — John A. Meggison, VI, writes an eight-page letter in longhand, which we wish we could reproduce, because it tells of a ten-day fight against floods last May to maintain service at the Empire District Electric Company, Riverton, Kansas, where he has been employed for 25 years. Jim Fouhy, I, has a son now an ensign in the Civil Engineer Corps of the Navy. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 71 Newbury Street, Boston 16, Mass.

1906

The Secretary wishes to acknowledge Christmas cards which were sent by a number of classmates. Sometimes, items of interest were added to the cards by the senders. Sam Nash was doubtful about being able to make the Alumni Dinner this year on account of his lameness.

On January 5 the Secretary had a telephone call from Halsey Philbrick at his home in Hartford, Conn. Halsey advised he would not be able to make the Alumni Dinner as he was leaving for the South within a few days. Halsey and his wife spend their winter vacation at Winter Park, Fla. He said they enjoyed being in the same town with Rollins College and in past years had listened in on some of the courses at the college.

The annual New Year's card was received from the well-known Boston engineering concern of Fay, Spofford and Thorndike, of which Carroll A. Farwell is a partner. The card included an announcement that this firm is now opening a New York office.

The *Electrical World* of December 11 showed a picture of Harold Coes, Robert M. Gates, and C. F. Kettering of General Motors. The occasion for the picture was the annual meeting of the American Society of Mechanical Engineers in New York. At this meeting, Harold was finishing his term as president of the society, to be succeeded by Mr. Gates.

Classmates will be sorry to learn of the death of one of our most interested members, Daniel P. Kelley, I. Daniel died very suddenly at his home, 182 Mount Vernon Street, West Roxbury, on December 29. The following notes about Dan were taken from the Boston *Herald* of December 30: ". . . A native of Boston, Mr. Kelley was a graduate of . . . Technology. . . . Following his graduation he was employed by the city of Boston in the water and sewer divisions. He became associated with the C. & R. Construction Co., general contractors, and at the time of his death was president of the concern. He was a member of the Boston and American Societies of Civil Engineers and the New England Roadbuilders Association. Surviving are his wife, the former Celia P. Haley, five sons, Lt. Francis J., USA, Daniel J., Lt. Robert P., Army Air Forces, Paul J., naval aviation cadet, and Pvt. William T. and two daughters, Misses Celia Ann and Mary E., students at Emmanuel College. . . ." Daniel will be much missed by '06 men who are in the habit of attending class affairs, as he was usually present on such occasions.

William A. Caldwell, IV, died on March 27, 1943. The class record shows that Caldwell had spent most of his life since graduation in Missouri and at the time of

1906 Continued

his death was living in Kirkwood in that state. — JAMES W. KIDDER, *Secretary*, Room 801, 50 Oliver Street, Boston 10, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills 82, Mass.

1907

Frederick L. Hall, son of our Ralph N. Hall, was among the aviation cadets who were commissioned second lieutenants in the Army Air Corps after completing bombardier training on December 24 at the Carlsbad, N.M., airfield. Ralph, who has three other sons older than Frederick, has been for many years manager of the electrical department of the United Shoe Machinery Corporation, with his office at 140 Federal Street, Boston, and his home at 226 Park Street, Newton, Mass.

Not until early January did I learn of the death of Erle Francis Whitney which had occurred on December 12, after an illness of several months. I wrote on behalf of the Class to Mrs. Whitney and received a gracious and appreciative reply enclosing a clipping from the Cleveland *Plain Dealer* of December 13. Erle was a native of Bleakhouse Plantation, Miss. After graduation in 1907 he became associated with the General Electric Company, continuing with them during his lifetime. From 1923 to 1929 he was manager of the company office in Portland, Ore., and then was appointed assistant district manager at Cleveland, the position that he held at the time of his death. During World War I, he was a captain with the 29th Engineers overseas. He was active in community fund work, having been at one time campaign chairman. He was a member of the board of directors of the war chest of Greater Cleveland, a director of the Electrical League of Cleveland, vice-president of the Cuyahoga County Boy Scout council, a past president of the M.I.T. Association of Cleveland, and a member of the Chamber of Commerce, the Cleveland Engineering Society, and the country club there.

Erle is survived by his wife, Jean Mackenzie Whitney (whose address, after February 1, became care of Mrs. John A. Laing, 12526 Southwest Edgecliff Road, Portland, Ore.), and by four sons. The oldest, Erle Darden, who will be 21 on March 21, is in the Army Air Corps. Kenneth Mackenzie, 20 in March, served for six months in the Army and was honorably discharged because of an injured back. Peter Hardy, 18 in February, is in the Army Air Corps. William Girault, now 16, will be graduated from high school in 1944 and go to Reed College in Portland, Ore. The two older boys attended Ohio University in Athens, Ohio, until they were drafted.

Erle was a very prominent member of our Class in undergraduate days, you will recall, having been editor in chief of *The Tech* during our third and fourth years, athletic editor of the 1907 "Technique," and a member of Class Day committee, among other activities. — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The second meeting and dinner of the 1943–1944 season was held at the University Club, Boston, on January 11. The following were present: Harold Gurney, Lang Coffin, Jeff Beede, Sam Hatch, Linc Soule, Doc Leslie, Toot Ellis, Myron Davis, Joe Wattles, Bill Booth, George Freethy, George Belcher, Steve Lyon, and Nick Carter. We had expected that Art Appleton and J. A. Kydd would be with us, but they couldn't make it. Linc Mayo was back in Vermont again, while Henry Sewell was in New York City, Bill Hunter in Chicago, and Fred Cole in Maine.

Winch Heath wrote: "Last summer I left Stone and Webster and joined the National Company of Malden, manufacturers of radio receivers. Barbara L. Heath was accepted by the WAVES as a candidate for officers' school and left on January 13 for Smith College. . . ."

Doc Leslie reported running into Harold Osborne and family last fall at Kezar Lake, where they were both vacationing and fishing. Doc said Harold is quite a fisherman. George Freethy told us of having lunch a while before with Harold Locke at the latter's home at Bryn Mawr, Pa.

After dinner George Freethy showed the colored movie he took of the gang at Oyster Harbors on our 35th reunion last June and then showed us a couple of recently released newsreels of action on some of the war fronts. Joe Wattles ran off two colored sound films produced by the Mexican Government. Harold Gurney had several colored photographs, enlargements of Kodachrome transparencies, which were much admired. The largest one was the picture of the 35th reunion which he had had made for Jimmie Burch.

After receiving the picture, Jimmie wrote Harold: ". . . I am enclosing a check for $10 to cover expense and postage on the pictures you sent me. Please apply any balance to the expense in sending out the others. It was a very generous gesture on your part, and I know it is greatly appreciated. . . ."

Harold replied: "I received your letter dated January 15 with enclosed check of $10 drawn on the Dubuque Bank and Trust Company 45–53 dated January 14, 1944, and numbered 3,417 to cover expense and postage on pictures sent to you. Also enclosed was a statement of the Dubuque Bank and Trust Company of Dubuque, Iowa. This afternoon I had the President of the Columbia Trust Company of my home town, East Boston (locally known as Joe Kennedy's bank), go over the statement very carefully. The Dubuque Bank and Trust Company appears to be loaded up with $2,598,470 of worthless United States Government securities, whose only security is a lot of now worthless gold buried somewhere in Kentucky. I rather suspect that the $10 check which you so kindly offered isn't much good. So I am turning it over to Linc Mayo to put into the '08 treasury. If he deposits it and it comes back 'no funds,' the joke will be on him. If it is good, the M.I.T. '08 treasury will be $10 richer, and then perhaps we could get George Glover to put in $10 more, saved out of travel or hotel expenses by sponging on surviving '08 classmen."

Linc Mayo wrote: "Your letter of the 17th with check enclosed was awaiting me tonight. You must be careful, for I'm not used to such shocks. Might be fatal. All joking aside, it is mighty good of you, and I'll see that the $10 gets into the class bank account immediately. I was very sorry to miss another of the class dinners. The worst of it is that I've now been returned to duty out of the Boston office each day. It's just too bad that they couldn't have made the change sooner. I don't believe that I'm permanently back in Boston, but after 13 months in Vermont a few weeks around Boston will be some relief."

We haven't heard from George Glover yet, but we are looking forward to his reply.

The Boston *Herald* of January 16 had interesting news from Flaherty: "In a letter from internment camp No. 3, Kobe, Japan, to his sister, Mrs. Frank St. John, of Orchard St., Hubert W. Flaherty, former selectman and superintendent of streets in Adams, who has been a prisoner of the Japs since the fall of Guam where he was a civilian aide to the governor general, describes briefly some details of prison life. The letter was dated April 23, 1943. Typewritten in concise style with only one paragraph evidently in conformity with Japanese regulations and punctuation the letter read as follows: 'Health excellent. Letter received with Tom's picture congratulations. Seventeen months confinement long time. Located good quarters, hill section no liberty. Climate similar Virginia. Butterfield House not Seamans Institute. Lost 28 pounds first six weeks, now weigh 160. Helped by Red Cross boxes. Front porch gone for good I hope. Was too fat to run far or fast. Keep busy reading, studying, playing quoits, cards. Officer day every second day, excellent water, bath one week. Making up for all the cereal didn't eat when young. Rise, six. Bed nine. Remembrances relatives, friends.'"

The following letter from G. William Bailey to Frank Chesterman '05, President of the Alumni Association, will be of interest: "Your letter and President Compton's annual report have been received and read with a great deal of interest, especially that part pertaining to postwar problems. I have been constantly engaged during the past three years on construction facilities for the Army and Navy, first at Fort Monmouth, N.J., for the Army, then at the naval supply depot and dry dock at Bayonne, N.J., and finally at the naval aircraft delivery unit at Trenton, N.J. This construction aggregated approximately $50,000,000, and it was my good fortune to manage the work as project manager for the contractors — Wigton Abbott Corporation of Plainfield, N.J., Mahony-Troast Construction Company of Passaic, N.J., and Tuller Construction Company of Red Bank, N.J. (all Cornellians, by the way, but with a great deal of respect for M.I.T. as well).

"I am now on my way with Mrs. Bailey to Rio de Janeiro, Brazil, where I have a special mission to perform for the Raymond Concrete Pile Company (more Cornellians). My permanent address will be maintained at 443 Wyoming Avenue, Maplewood, N.J., and in Rio de Janeiro either care of Servix Engenharia Limitada or care of the National City Bank. I should appreciate receiving from you a list of M.I.T. men located in South America. . . ."

The Class has about 350 members now living out of a Class of about 500. Of these, 110 are contributing to the Alumni Fund. A good many of those who have not contributed would do so, I believe, if some class-

1908 Continued

mate would talk to them. Each of you who reads this is a contributor. Won't you make yourself "a committee of one" to talk or write to the classmates with whom you are in contact and ask them to contribute if they have not already done so? If each of us could get one more contributor, our class record would be very satisfactory.

Letter of appreciation for the reunion photographs were received by Harold Gurney from Harry Rapelye, Continental Can Company, Inc., 100 East 42d Street, New York; H. R. Sewell, the cooling and air-conditioning division, B. F. Sturtevant Company, Hyde Park, Mass.; and A. S. Cohen, Room 1107, 101 Tremont Street, Boston.

Dr. Dwight Dickinson, Jr., formerly commander, has been promoted to captain and is senior medical officer at the United States Naval Training Station, Bainbridge, Md. — Henry V. Spurr's address is 211–11 33d Road, Bayside, Long Island, N.Y. — Hobe Ferris, lieutenant commander, formerly located at Woods Hole, is now stationed at Newport, R.I.

The third dinner and meeting of the 1943–1944 season will be held at the University Club, Boston, on Tuesday, March 14, at 6:00 P.M. Please note that we are beginning a little earlier than usual. We expect to show some interesting movies and Kodachromes. The usual notices will be mailed early this month. Please make your plans to be with us. — H. LESTON CARTER, *Secretary*, 60 Batterymarch, Boston 10, Mass.

1909

Paul relates a most interesting story: "Here's a story that involves the Maine Coast, though the real story gets us up to Greenland. Last November 19 on the Lackawanna ferry crossing from Hoboken to New York, I was reading in the *Times* the tale of the rescue of three Royal Air Force men who had been cast away on a bare rock off Greenland and were about to give up hope of being rescued. On the tenth day they saw that a small ship carrying Army officers along the coast had broken down near their rock, and they had tried to signal with a hand mirror and a puff of smoke from a cartridge. As I read, rather casually at first, I must admit, I noticed that the officer in charge of the small vessel was Major John T. Crowell of Isle au Haut, Maine, and from then on I devoured every word. For was that not the same Jack Crowell who was a friend to all of us who know the isle, and was he not the same Jack who had gone as navigator from Tenants Harbor to the North with MacMillan . . . ?

"Now the scene changes to Fifth Avenue. Another friend of mine is a distinguished viking named Buhl, the younger of two fine Danes who run the Jensen store, where beautiful Danish silver was available until Denmark was overrun. Being an American citizen, Buhl asked me many months ago about getting into our Army. He is now an officer stationed in Greenland. I write him now and then, and I told him about Jack Crowell and the rescue I've recounted. He replied: 'Among many other things, I am also the postmaster here. The other day I went down with a detail to bring some mail and to say good-by to a friend who was leaving here — one I had known at Army Post Office and particularly liked. I brought back the first mail in 22 days — among it your letter about Crowell — Major Jack Crowell, the man to whom I had just said good-by!"

On January 3, the Review Secretary was most agreeably surprised to receive a telephone call from our Chicago Secretary, George Wallis, II, who was leaving for home on the afternoon train. Fortunately, he was able to have luncheon at the Harvard Faculty Club, and we had a most interesting chat. George is president of the Creamery Package Manufacturing Company, which makes refrigerating and pasteurizing machinery and now does only a small amount of the packaging business. In the latter part of February he made a trip to the Pacific Coast. Both of his married daughters live near Boston, and he had an opportunity to visit them during the holidays. Elizabeth Dodge lives in Wenham and has a son, Sam, four years old, and a daughter, one year old. Frances Sandford, who lives in Wayland, has two daughters, one three years, the other one year. On his Pacific Coast trip, George planned to look up such classmates as he could.

The New York *Herald Tribune* of January 12 showed Harrison E. Spangler accepting the invitation of the Chicago citizens' committee to hold the 1944 Republican convention in that city. Right in the front of the picture was Ed Ryerson, I. We hope that Ed will give us some kind of story about these important convention arrangements. — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries:* MAURICE R. SCHARFF, 3860 Rodman Street, Northwest, Washington 16, D.C.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

Your Secretary's only source of notes during the war appears to be his chance meetings with various members of the Class during his travels.

Charlie Greene, who is still associated with the firm your Secretary was connected with before entering the Army, is now a grandfather of twins. There is an element of great sadness in the event, however, for Charlie's daughter was married to an aviator who was shot down over Germany on November 10. Speaking for the Class, we tender our sincere condolences to Charlie and his family for the loss they have suffered, and congratulations to him upon becoming the grandfather of twins, a boy and a girl, early in January.

Al Huckins is still seen occasionally on his usual trips around the financial district of Boston. He maintains his genial smile and looks the same as we all knew him years ago. Al has two sons and a son-in-law in the service. — Al Curtis maintains his general routine of years, commuting daily from Gloucester to Boston. He is engineer for the Boston and Albany Railroad and has his problems under wartime conditions. Al's son, a captain in the Marine Corps, is stationed in the South Pacific, where he has seen some of the worst going in this theater of operations.

From the Mobile *Press Register* we learn that Billy March's only daughter, Margaret Ann, was married on December 11 to Frank Durwood Moore, United States Naval Reserve, the son of Dr. E. C. Moore, former pastor of the Oakdale Methodist Church, and Mrs. Moore. Margaret Ann attended Duke University and the University of Alabama. Billy and Mrs. March accompanied her to Newport for the wedding, which was solemnized in the chapel of the naval base, where Mr. Moore is in training.

"After the wedding," according to the *Press Register*, "Mr. and Mrs. March left for Long Island to visit Mr. and Mrs. William Haugaard, Mr. March and Mr. Haugaard being former room mates at . . . Technology, and also went abroad together and studied in Europe. . . ." Billy has been practicing architecture in Mobile since he was graduated.

John Wentworth is working in the office next to that occupied by your Secretary. He is one of the chief negotiators for the renegotiation of contracts in the New England Division Engineers while on leave of absence from the firm of Metcalf and Eddy, to which he will return after the war. — HERBERT S. CLEVERDON, *Secretary*, 117 Grant Avenue, Newton Center 59, Mass.

1911

Those of us who had the privilege of knowing Paul Kellogg's fine wife, Dorothy, can realize what a loss he and his family sustained when she died in December. Our hearts go out to you and yours, Paul. In a letter at the turn of the year, Paul said: "The other news is brighter. My son Leonard, who is now in the Navy studying to be a radio technician, met one of the nurses who was ministering to Dorothy and married her in October. She remains in Montreal continuing her practice, but they see each other every two or three months. My daughter, who was married nine years ago, recently had a baby girl added to her family of two young boys. Her husband, being a pre-Pearl Harbor father, doesn't know where he stands at the moment."

A partner in Stevenson and Kellogg, Ltd., management engineers, with offices in Montreal and Toronto, Paul handles the Montreal end and says they have been "as busy as we possibly could be with the staff which we have." He has been doing some public speaking on the side, he added, enclosing a copy of a speech on "The Pulp and Paper Industry — the Currency of Civilization." As acting president of the Newsprint Association of Canada, he delivered it before the Canadian Club of Toronto in December.

Highlights in the Kellogg speech include the sentences: "Paper is universally used to record ideas, just as money is the means by which we exchange things. . . . Canada's postwar problems are not purely economic. A cure has to be found for the devastating sense of frustration today so typical of western civilization, for the spiritual bankruptcy of this age. . . . It is fortunate for Canada that its greatest manufacturing industry is pulp and paper because (1) the products of the industry are highly essential and widely diversified; (2) there is a high probability of its permanence; (3) it is still a young and developing industry; and (4) in its operations it reaches a large number of other Canadian industries and employs many workers in widely scattered communities. . . . Paper is truly the currency of civilization."

1911 Continued

Here's a little secret: If you want to hear from a classmate, mention him in the class notes. Witness Bob Haslam, X, Vice-president of the Standard Oil Company of New Jersey, who sent me the last issue of his company publication, the *Lamp* — you see I had mentioned in the December notes that Bob was doing a grand job as editor. He writes: "In times of peace the oil business keeps anyone hopping around like mad, but in times of war it is even worse. So if you don't ever hear from me, don't think it's lack of interest — it's mostly lack of time. . . . Rufus Zimmerman, IX, is now a near neighbor of mine out at Short Hills. We've lived in the same town for the last four or five years, but now we're only a couple of hundred yards away from one another."

Bob also thoughtfully enclosed copies of two recent talks he had given. Haslam at the mike was quite a shot, being a fine candid-camera view of our hero in the *Lamp*'s description of the dedication of a new company refinery at Baltimore, where Bob spoke on "New Frontiers." In opening his talk, Bob said he had spent "about one-third of the past 25 years teaching chemical engineering, about one-third in the field of scientific research, and one-third in advertising and sales." Pointing out that these are not actually as dissimilar as they might seem, he continued: "We can open the frontiers not only of the east and west, the north and south, but also of the depths of the earth and the skies above. In the oil industry we have gathered from deep in the earth the riches that Nature holds for us. . . . In chemistry, physics, and engineering the men who've developed things have penetrated new frontiers of science and have brought home to us a radically new environment, one in which we shall be surrounded with a host of new materials made from the dreams of men. . . . America is a nation of frontiersmen, and the pioneering spirit did not die with our advancing civilization. Our political theory is based on the concept of the education of the individual and keeping him free from that kind of regimentation which saps the driving energy of men. Whether he wears a coonskin cap, grimy overalls, or the suit of a businessman, the American is always a frontiersman, pushing forward toward the horizon of tomorrow."

In an address before the Brooklyn, N.Y., Rotary Club last fall, titled, "American Business and World Trade," Bob told of miracles of development in the oil industry, highlighting 100-octane aviation gas, synthetic toluol, paraflow, paratone, and Buna and butyl rubbers. He summarized policies of his company with respect to world trade as follows: "(1) We do not believe in controlling production. (2) We do not believe in combinations to control price. (3) We are for business dealings with people in foreign countries. (4) We are against secret agreements." In conclusion, he said: "When we have won this war, all of us together must make world trade work for everybody. Only in that way can we hope to develop ways of keeping this world of ours at peace. Swords can once more be beaten into plowshares, and the miracles of science and industry that have been made into such mighty weapons of war can then be used to make this globe a better place for all the people of all the lands of the earth."

Well, it's Grandpa Kenney now, for on New Year's Day at Cincinnati, Ohio, William R. Kenney and his wife became the parents of a son, George. Congratulations! Harry Tisdale, V, caught the announcement in the New York *World-Telegram* — then a fortnight later sent me a clipping from the Washington Sunday *News*, giving me my first intimation of "the sudden appearance in Washington of Lt.-Gen. George C. Kenney, as representative of Gen. Douglas MacArthur in a three-way conference with President Roosevelt and Admiral William F. Halsey." In a later press conference the President "tossed out a hint that Admiral Halsey's carrier planes and Lt.-Gen. Kenney's land-based bombers may have worked out a new two-way air squeeze play against the Japanese in the Pacific." Another news hawk, O. W. Stewart, I, sent me a Kenney clipping at about the same time, with a Boston *Herald* snap of George's two nieces, Leslie and Dorothy Glazier, attractive daughters of Gordon Glazier, VII. The girls finished high up in this year's New England figure skating championships at the Skating Club of Boston. As O. W. said when he sent a clipping about George's trip to Washington: "Too bad we couldn't have contacted Kenney and had a class dinner!"

Stewart also advised me that Ray Lord, VI, who has been secretary and assistant treasurer of the Manufacturers Mutual Fire Insurance Company, Providence, R.I., was made vice-president and secretary at the annual meeting in mid-January. More power to you, Ray! And don't forget that three of the Stewarts' boys are "in there pitching": Oswald, a captain of antiaircraft artillery with United States China-Burma-India troops in India; Pearson '42, a lieutenant, junior grade, at Pearl Harbor; and David, a staff sergeant of field artillery, at Camp Rucker, Ala. Their youngest son, Reed, is just 17. A splendid record! Which reminds me, please send me in word of all Junior Eleveners in the service — your own or your classmate's.

George Cumings, VI, sent me a clipping datemarked Lowell, January 2: "Ralph E. Runels has submitted his resignation as superintendent of the Lowell Water Works. . . . President of a construction company that bears his name, Runels will leave the city service to devote all of his time to private business." — Aleck Yereance, I, an Army major, writes from the capital: "As of January 1, I was transferred to the office of the director of plans and operations, which is part of the office of the commanding general, Army Service Forces." From the Windy City, Lloyd Cooley, X, informs us that he is now on the staff of O. W. Stewart's inspection division of the Associated Factory Mutuals. "During one of my temporary subcontracting jobs," he adds, "I had to fly down to Las Vegas, Nev., last spring to observe the assembly of a big nickel-clad caustic-soda evaporator. It was an interesting experience. Incidentally, I am working indirectly for John Wilds, II, since he is president of Protection Mutual Fire Insurance Company, one of the association here."

Following a quarterly conference in New York City in mid-January, your Secretary was honored with his second promotion since joining the George S. May Company, business engineers, a year ago. I am now regional director of the field service department for region 2, comprising New England and eastern New York State, still keeping my headquarters in Worcester.

Just a few address changes to close: Harry S. Alexander, II, 469 Highland Avenue, Meadville, Pa.; Ralph T. Hanson, XIII-A, a captain in the Navy, inspector of naval material and superintendent of shipbuilding, 1100 Chester Avenue, Cleveland, Ohio; Clarence A. Woodruff, X, South Main Street, East Hampton, Conn. — ORVILLE B. DENISON, *Secretary*, 82 Elm Street, Worcester 2, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

1912

It is with deep regret that we note the death of Sylvester Schattschneider, I, on July 2. We have written for details. — Harold C. Mabbott, II, an Army colonel, has been transferred from Camp Edwards. He now has an A.P.O. address. — Harold Danser, VI, has recently associated himself with the New York Stock Exchange firm of Moors and Cabot, 111 Devonshire Street, Boston. — Jim Cook has completed his three-year term as class agent and is passing his papers on to his successor, who will shortly be announced. Jim has done a fine job in pulling the Class up to approximately average standing, but let's make a resolve to help his successor put us above par. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown 72, Mass.

1914

Word has just been received of the death last June 15 of George S. Stevens. He will be remembered by Course VI men as one of the "old reliables" who could always be counted on to keep a professor occupied when some of the rest of us were not quite so well prepared. Although located in Boston as a member of the Morrison-Stevens Company, George was seldom seen at class dinners, remaining throughout life the serious, fully occupied type.

Probably many classmates read the *Saturday Evening Post* story of Donald Douglas. Some of the interesting features in that article were that Douglas has 165,000 employees, an annual output considerably over a billion dollars, and that the owners of the company receive less on their investment than the employees pay to their unions in dues. If present expansion plans are continued, Douglas alone will reach an output this year equal to the combined outputs of all of the axis nations.

Brigadier General Alden Waitt is again in Washington after an extensive tour of foreign duty. Your Secretary never ceases to be surprised by the steady traffic between the war theaters and Washington. Don Douglas and his fellow aircraft builders certainly have reduced the time scale of the world. On recent trips to Washington, in addition to talking with Alden Waitt, your Secretary met an officer who had been in the European theater three days before, one who had directed and taken part in a very important mission in the Solomons ten days before, and another who was fighting in the thick of the Italian front only a week before. On another occasion, exactly a week after having talked with General Chennault in the relative calm of the Pentagon, your Secretary read in the paper that

1914 Continued

the general had arrived back at the China front. A long distance has been traveled since Porter Adams provided a real flying plane for us at our sixth-year reunion. And remember the submarines at our tenth?

Ross Dickson is making great progress in the Alumni Fund. Just one more push, and we shall be over the top! We are already past the 90 per cent mark — and 100 per cent is just ahead. — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge 39, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York 19, N.Y.

1915

By now you have all received my plaintive plea for class dues. It's not much — it doesn't come often — so shower down and send me your checks at once. No postage required; just stick your check in the self-addressed envelope. You all did well helping to hit our quota in the Alumni Fund. Let's see what you can do now on a smaller scale on class dues. My thanks!

There ought to be more Jerry Coldwells. He comes to bat just when we need a clean hit, and he drives in the winning run with this good letter: "So you're running out of data about the boys, are you? Possibly many of them are in the same trouble that I am: Our jobs fall under the government 'secret' classification. . . . A good part of my work is such that I'm not supposed to tell where I am going, when I leave, or when I return. In too many cases, I'm not too sure of the latter item myself. . . . I have run into Livermore several times as he was operating a loading plant generally similar to this one. United States Rubber had the contract. The government closed that plant — or rather it was shifted to other work — and the Rubber company put Livermore on other work, I guess. I get down here for a few days each month as a sort of a check. Since I check jobs on the way down and back, I am out of New York for two to three weeks each month. Many longer trips, too. . . . Can't give you much information but so far as this particular plant is concerned (Arkansas), we won an Army-Navy 'E' in February, 1943, and our first star in September. Give me a call the next time you are in New York. I may be in the office, and if so, we can at least have lunch together. My best to the Boston crew."

George Urquhart resigned on February 1 as president and treasurer of Manville Jenckes Corporation, Manville, R.I., to become vice-president of the Commercial Investment Trust of New York. George, who was originally with the Bankers Trust Company of New York, came to Manville Jenckes Corporation as receiver in 1931 and was made president of the company when it was reorganized in 1933. He plans to live in Greenwich, Conn., so perhaps we shall get a chance to see him at some of the New York class affairs. Good luck to George in his new position.

As we get older, class contacts and friendships become closer and cover a wider field. Frank Scully writes: "Frank, Jr., is down at Davidson College as an air cadet. He arrived there about two weeks before Christmas, and I immediately looked up to see if any of the Class were near by. . . . I wrote to both Ed Proctor at Salisbury, N.C., and Norman Doane at Charlotte, N.C., and in return received a very fine letter from each. Both Norman and Ed invited Frank to their homes for Christmas. You can realize how grateful I felt. . . . Frank went to Ed's and had a swell time. (The blondes sold him, and according to Frank, they were very attractive.) Last week he had dinner with the Doanes."

Ed Proctor's letter to Frank read as follows: "It was indeed a pleasure to hear from you once more. We have entertained so many soldiers at our house that our place has been generally known as U.S.O. No. 2. We have been very glad to have all of the boys, but it would be particularly nice to have someone like your son, in whom we should have a real personal interest. It happens that I have two blonde daughters who are generally considered quite good looking and will be home for the Christmas holidays, so that it would work out perfectly if Frank, Jr., brought another boy with him. In my letter to your son I am enclosing a snapshot of the two girls which might act as a little additional bait in getting him here. . . . It seems nice to have somebody remind me once more that I used to try to play football in the days of long ago as almost everyone around here has me classified as a doddering old man. . . . If you see Weare Howlett or any of the other boys around, please give them my very best regards and accept my best wishes for a pleasant Christmas season."

Norman Doane replied: "I was glad to hear from you and to know that your son, Frank, Jr., is at Davidson. Your letter came in my absence, and Mrs. Doane told me she had already written your son and invited him to our house for Christmas. On Christmas afternoon and evening at the Charlotte armory there is a 'stage door canteen' for all servicemen away from home, which he will have a chance to attend if he prefers it to visiting with the old folks and our 13-year-old daughter. . . . Like most other people here, we try to keep a few Army boys 'on the string,' and usually have some for Sunday dinner. Best wishes for 1944."

Maybe Ed should display his attractive blonde daughters at the next big class reunion. There are still some eligible bachelors among us. I showed Weare Howlett these letters, and now that he is twice a grandfather, he is far from showing his old class football form.

According to the latest information in the Alumni Office, twelve members of our Class are serving in the United States Army and six in the United States Navy. Two of our classmates are included in the high command, published in "The Institute Gazette" of this Review, page 270. They are Alexander G. Gillespie, brigadier general, United States Army, and Charles L. Brand, rear admiral, United States Navy.

Remember those famous words, "It is more blessed to give than to receive," and send your class dues check at once to "help Azel"! — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

1916

Allen D. Pettee, VI, who for some years has been district sales engineer at Chicago for the General Cable Corporation, has recently been transferred to the same company's Bayonne, N.J., plant, where he is technical superintendent. In writing Allen, I offered to give him the names and addresses of local classmates. He replied that he was so infernally busy that he could hardly think of looking up classmates at this time. Some classmate, however, may wish to look up Allen. His address is 15 Euclid Avenue, Summit, N.J.

I received a short note recently from Joe Duggan, XI. He is the owner of the Unionville Woolen Mill. Somehow my principal recollection of Joe was when he came up to several classmates wearing handsome new woolen sport coats, took hold of the lapels, examined the material, and remarked, "I'll have those coats in one of my shoddy mills before long." Joe wants to know what has happened to the class catalogue of biographies. Perhaps Walt Binger can drop Joe a note. Joe's address is Grove Street, Franklin, Mass.

Ed Weissbach, who lives in Merchantville, N.J., and keeps the Campbell Soup Company's plant in operation at Camden, N.J., ventures the following information concerning four classmates: "Spencer Hopkins' son Philip was married on October 6 to Elizabeth Jane Beardslee at Bloomfield Hills, Mich. Spencer, as you know, is with the General Motors Company in Detroit. He has another son, Allen, who is in the Army and assigned to an engineering course at the University of Cincinnati.

"Flipp Fleming's son Bill, who was assigned to the Lakehurst Naval Air Station last year, has spent ten months in South America and is now located in this country for further training. Flipp's daughter Margaret finished Bennington last August and is now working at Goodyear to help the war effort. Flipp did not say what his own activities were in Akron, but we know he has always had a big job.

"Hal Gray enclosed with a Christmas card a new letterhead, that of the Gray Manufacturing Company, Syracuse, N.Y. Underneath was written, 'Born December 1, 1943.' So Hal has reorganized his old pottery business and is now out on his own, if I interpret correctly. Arvin Page is now chief engineer of the Bahnson Company in Winston-Salem, N.C. When he comes through here we are apt to get a phone call, but so far we have not been able to persuade him to stop over."

These notes are the result of the meager response to your Class Secretary's request for letters. I hope that more will take the hint after reading this month's notes. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston 9, Mass.

1919

The Class has decided definitely on the dates of July 28, 29, and 30 for our 25-year reunion. The place will be decided later, at which time announcements will go forward. Plan your vacation to include this week end with the Class. There are still many who have not sent their 25-year biography, photograph, and gift for the Institute. The committee is to be congratulated on their efforts in the collection of this material. Let us finish up the job in good shape at once.

Ralph H. Gilbert, who is an engineer with the New York Telephone Company, has two youngsters, ages 12 and 10, and lives in Brooklyn, N.Y. — Lieutenant

1919 Continued

Commander H. H. McClintic, Jr., has been in touch with Clyde C. Jones at Cambridge Springs, Pa., and with Sarkis M. Madancy at Pittsburgh. Prior to his enlistment in the Navy in August, 1942, Howard was president of Ferguson and Edmondson Company in Pittsburgh. His company is engaged in heavy construction work.

Ted Shedlovsky, who is at the Rockefeller Institute, York Avenue and 66th Street, New York City, has been on special research and development for the Navy during this war and has carried out scientific research on the theory of solutions and physical chemistry in medicine. Ted is councilor of the New York Academy of Sciences for the period 1944 to 1947. — Ervin M. Kenison, 1441 Chapin Street, Northwest, Washington, D.C., is an engineer with the Federal Power Commission in Washington. He has had plenty of work there during the last year and a half, and believes there will be plenty of work after the war. His older girl is married and his second girl and his boy are in high school. — Stuart J. Hayes, 20 Fairfield Street, Springfield 8, Mass., is a fiber expert and chemist for the Ludlow Manufacturing and Sales Company. Stuart has twin girls aged 17 and a younger daughter aged 9. The twins were elected to the National High School Honor Society, North Quincy, Mass.

Recent changes in address are: Frances M. Burlingame, 40 North Goodman Street, Rochester, N.Y.; Charles C. Likins, 20 East 56th Terrace, Kansas City 2, Mo.; and Harry Zimmerman, Jr., Box 427, Route 1, Warren, Ohio.—Richard S. Holmgren, 3028 College Avenue, Berkeley, Calif., writes: "I am located in the bay area of California as project engineer with the Pacific Bridge Company at Alameda, on the construction of floating dry docks for the Navy. We are turning out a dock every 20 days."

Marshall C. Balfour has returned from India and will be in the States for a few months. He dropped in to see your Secretary on January 12 and turned over his 25-year material. Bal covers India and China for the Rockefeller Foundation. He reported on Aubrey P. Ames and his wife who are with Standard-Vacuum Oil Company and are interned in Manila. — Nelson A. Bond, whose home is at 50 East 10th Street, New York, is married and has one boy who is in the Army overseas. Nel is staff supervisor in connection with maintenance of telephone, telegraph program, and telephoto services for the American Telephone and Telegraph Company, 32 Sixth Avenue, New York. — Maurice E. Goodridge of 120 Amherst Street, Worcester, Mass., was loaned for the duration by New England Power Company to the Worcester Industrial Sales Office. — John E. Cassidy is with the Bell Telephone Laboratories.

Let's have a well attended 25-year reunion July 28–30. Plan it ahead! All out! — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York 17, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston 16, Mass.

1921

It is with sorrow that we record the passing of two of our members — William H. Leonori and William A. Bevan. On behalf of the Class, we wish to extend sincerest sympathy to their families.

William Henry Leonori, Jr., III, of Smithtown, Long Island, N.Y., died suddenly at his home on December 25. Bill, who was associated with his father as secretary and treasurer of W. H. Leonori and Company, steel manufacturers of New York City, was a former mayor and village trustee of The Landing, Long Island. He was born in Brooklyn, N.Y., on June 23, 1898, and prepared for the Institute at the Boys' High School. A member of Delta Tau Delta, he was on the track squad, on the winning Field Day tug-o'-war team in our sophomore year, and also in the Tech Show and the Musical Clubs. He leaves his wife, Mrs. Dorothy Deutzman Leonori, and three daughters, Elizabeth, Sarah, and Ann Leonori.

William Alfred Bevan, associate professor of aeronautical engineering at Purdue University and former professor of aeronautical and mechanical engineering at Iowa State College, died at his home in Mooresville, Ind., on July 5, according to a note received from Mrs. Bevan.

Llewellyn B. Griffith, I, who held the rank of captain in the Army, was disabled in action and has returned to civilian life. Grif is now with the Hays Process Company, 905 Medical Arts Building, Waco, Texas. — Samuel T. Drew, I, has left these shores again on another diplomatic assignment, this time to Guatemala. Sam's address is Apartado Postal No. 14, Guatemala City.

David O. Woodbury, VI-A, realized the fruit of several years of research and writing with the appearance on the bookstands on January 31 of his new book, *Beloved Scientist*, the biography of Elihu Thomson, published by Whittlesey House. The combination of Dave's outstanding ability to present his subject in an intensely interesting manner and a subject so dear to our memory as the life of the man who served as president of the Institute at our own commencement, puts this book on the must list for everyone in the Class.

Ten of the Class were present at the winter smoker of the M.I.T. Club of Northern New Jersey in Newark on January 13. Attesting to the popularity of these meetings and the opportunity to meet many from our own and neighboring classes, Dugald C. Jackson, Jr., VI-A, and Ralph M. Shaw, Jr., VI-A, came up from Philadelphia again. Others in attendance were Mor Aronson, Max Burckett, George Chutter, Cac Clarke, Sumner Hayward, Fred Kowarsky, Louie Mandel, and Ralph Wetsten.

New addresses have been received for John Campbell, XIV, 4308 Lewiston Road, Niagara Falls, N.Y.; Andrew Deane, XV, 7267 North Pennsylvania Avenue, Indianapolis, Ind.; Lieutenant Commander Glenn H. Easton, XIII-A, Skinner Engine Company, 337 West 12th Street, Erie, Pa.; Captain Justin F. Jason, I, Army Air Corps, Truax Field, Madison, Wis.; Robert L. Moore, XV, Sheraton Corporation, 31 State Street, Boston 9; Colonel David A. Newcomer, I, Hotel Georgian Terrace, Atlanta 3, Ga.; Sherman E. Nichols, XV, 516 South Reese Place, Burbank, Calif.; and Alex Wishnew, X, 225 Insurance Street, Beaver, Pa.

What happened to that resolution to drop a note to your Assistant Secretary for these columns? — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, Federal Telephone and Radio Corporation, 1000 Passaic Avenue, East Newark, N. J.

1922

On a recent trip to Cincinnati, the Secretary enjoyed an evening with Francis W. Spalding, who is in charge of refrigeration and air conditioning for Procter and Gamble and is having plenty of trouble to keep things running in these trying times. He was feeling rather stiff in the joints, having secured a pair of skates and taken to the ice for the first time in many years. He said it was worth it, however, because he had initiated his only child, Carol (age 11), into the art. He sends his regards to the Class and is still regretting that a combination of circumstances, including moving into a new home, prevented his attendance at the last reunion. Dyno frequently sees H. B. Upham, who is the Pratt and Whitney representative in Cincinnati.

George T. Bailey, X, has been elected vice-president and general manager of the Photogravure and Color Company of New York City. Bailey is well known in the graphic arts and is president of the American Institute of Graphic Arts and formerly assistant printer to Yale University. Prior to his new position he had been vice-president of William E. Rudge's Sons, Inc., New York City, of which he will continue as a director.

A welcome letter has been received from Hugh Shirey, who is with Tucker, Anthony and Company in Rochester, N.Y. Hugh won't be outdone by others in the Class who have sons in college or the armed forces. His son George entered Cornell in July in V-12, and his daughter was married last September to a second lieutenant who is a navigator in the Air Forces and expects to be going overseas before long.

John F. Otis, II, former executive Vice-president of the New York Credit Men's Association and one-time business adviser to Ambassador Winant, has been assigned to Jefferson Barracks, Mo. Captain Otis won many medals for service as a flier in France in 1918. Before returning to service as a captain in May, 1942, he was with the Fayette Canning Company in Washington Court House, Ohio.

Elliott G. Peabody, II, has been appointed acting assistant adjutant general for the Army Air Forces central flying training command at Randolph Field, Texas. His wife is residing with him at San Antonio and one daughter, Shirley, is attending Louisiana State University. Before entering the service, Captain Peabody was sales manager of the Citizens Gas and Coke Utility Company in Indianapolis. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. WHITWORTH FERGUSON, *Assistant Secretary*, Ferguson Electric Construction Company, 204 Oak Street, Buffalo, N.Y.

1923

We have Jack Keck carrying the ball on most of the notes this month. He writes: "My old pal, O. L. Perkins, now a major, has not written directly, but his mother wrote me a nice letter to tell of his activities. His wife and twin girls, now of junior

1923 Continued

high age, are still located at Hartford, Conn. O. L. is still in Africa, not having been sent to Italy with the advancing American Expeditionary Force. Number three of my old 1923 triumvirate, S. P. MacDonald, who was my roommate in the sophomore year, has been with General Foods now for many years. A year ago, as a result of Christmas correspondence, I reported to you that he was located at Harlingen, Texas, after several years in Rochester, N.Y. This year Mac and his family are back in Rochester. Mac's son, who had been a University of New Hampshire student, entered the Navy, but was spending a pleasant holiday furlough with his folks when they answered my letter of inquiry.

"We finally had our M.I.T. party in north Jersey on January 13. Eleven 1923 men present included Lem Tremaine, Bill Lutz, Doc Randolph, Herb Hayden, Larry Barstow, Bob Henderson, Jack Keck, H. L. Cobb, Jim Robbins, Benjamin Cooper, and Ed Pierce. Pierce, Course VI, is a newcomer, who used to room with Charlie Roll, X, at M.I.T. Pierce is with Federal Telegraph in Newark, working for Cac Clarke '21."

Leslie W. Powers is now assistant secretary of the Buffalo Insurance Company, having been transferred in September to the home office of the company in Buffalo. — B. P. Harris says that a recent move from Milton, Mass., to Providence, R.I., his home town, is simply a transfer in the employ of C. H. Sprague and Son Company. — Gerry Fitzgerald, Howard Russell, and your Secretary had dinner together in Washington recently, when we were severally there on business. Bernie Proctor stopped by too, but couldn't stay. Gerry is associated with him in the solution of some of the Army's food problems. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree 84, Mass., JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1926

Professor Locke '96 has kindly given me permission to quote the following from a letter received from E. N. Roberts: "I should like to tell you more of my activities here at Potrerillos, Chile. When I came back to Potrerillos after the depression shutdown, I had been working for Cerro de Pasco in Peru, where I was in charge of the extension of the Kingsmill Tunnel under the Morococha ore body. My old job in Potrerillos was that of general foreman in charge of leaching operations, and then I was promoted to assistant superintendent of the oxide plant. This means that for the last two years my duties have covered the leaching plant, slimes plant, purification plant, dechloridizing plant, tank house, casting plant, and oxide tailing dams. . . . The supervision of all of these plants has been extremely interesting work, and it goes without saying that I have been very busy since I had the great pleasure of visiting with you when I was last home on a vacation in the United States in 1940. . . .

"My wife joins me in sending you our very best wishes. It would be a great kindness for me if you will please extend these greetings to Professors Hayward '04 and Hutchinson '09, and to any of the 1926 men whom you may see. They will remember me, more likely, with my old handle of 'Bull' Roberts. My good old classmates of '26 tagged that onto me, and though you would hardly believe it, way down here in Chile nearly 20 years later, whenever my name is posted for the golf tournaments in Potrerillos, it is as Bull Roberts. . . ."

Another Course III man, Arthur Johnson, who is with the Reynolds Metals Company in Alabama, has been in Cambridge recently in connection with research under way. It has been a pleasure to renew acquaintanceship with him and to hear about his successful and important work with his company. — Martin Fireman writes that he has been promoted to captain in the antiaircraft searchlight battalion, with which he has been associated for a year. — C. Humphreys Barry is back in civil life with the Universal Atlas Cement Company in New York. — We are glad to see that major has been added to the name of Chenery Salmon, who is with the Chemical Warfare Service, and that Captain Elmer C. Warren is gradually moving northward, being located now in Atlantic City.

George Smith is back in Boston part time, having left the War Production Board to accept a post with the Du Pont Company in their synthetic rubber division. He is spending a portion of his time at one of their plants and a portion as a representative in Boston. It is good to have George back on the home lot. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1927

Thomas A. Knowles has been promoted to the positon of vice-president of Goodyear Aircraft Corporation. He was formerly a vice-president of American Zeppelin Transport, Inc., and more recently was sales manager of Goodyear Aircraft. The announcement was made by P. W. Litchfield '96. When at Technology, Tom was an active member of the Aeronautical Engineering Society and is well remembered for his specialty act in the Musical Clubs. To our knowledge two other members of the Class are also vice-presidents of major aviation organizations: J. A. Herlihy of United Air Lines and B. A. Gillies of Grumman Aircraft Engineering Corporation.

Harriet Allen, who entered Technology from Wellesley in 1925 and received her doctor's degree in 1927, was temporarily assigned as a physicist in the Navy Bureau of Ordnance, Washington, D.C. More recently she returned to her permanent post as a professor at Hollins College, Virginia. — Ralph B. Johnson before Pearl Harbor was personnel manager for the Hawaiian Electric Company. He saw the attack on Pearl Harbor from his home in Honolulu. He is now a lieutenant commander and writes often to friends here. — Two members of the Class are with the Grinnell Company: Dan C. Metzger is in their New York office, and Bruce E. Sherrill is in the Atlanta, Ga., office.

C. L. Simonson, formerly of Dongan Hills, N.Y., has been promoted to the rank of lieutenant colonel. In 1940, Colonel Simonson volunteered for Army service and in the fall of that year he received his commission as a reserve officer. He resigned a position with Morgan, Stanley and Company in 1941 when he was called into active service. The following members of the Class have recently been promoted to the ranks indicated: Major Abraham Mankowich, Major Elmer Andrews, Lieutenant Commander Richard C. Turner, Jr., Captain Nathan G. Evans, and Captain Milo R. Williams.

Notices of the following changes in address have been received: John J. Boyle, Jr., from Flushing, N.Y., to 64 Hartford Street, Dorchester, Mass.; Lenvik Ylvisaker, from Pittsburgh, Pa., to American Shipbuilding Company, 1410 Terminal Tower, Cleveland; Howard O. Woods, from Schenectady to 10 Ridgecrest West, Scarsdale, N.Y.; We-Tuh Kwauk, from Shanghai to Apartment 73, 969 Park Avenue, New York; Elwood J. Umbenhauer, from Laredo, Texas, to 4131 Cambridge Street, El Paso, Texas; Conrad R. Waldeland, from Luther College, Decorah, Iowa, to Washington and Jefferson College, Washington, Pa.; Harland P. Sisk, from General Electric in Schenectady, to their Pittsfield plant; George W. Brown, from Brookline, Mass., to 121 West 15th Street, New York; Samuel A. Kaswell, to 31 Fernwood Terrace, Nutley, N.J.; Herman H. Steinberg, to 18 Parkview Street, Roxbury, Mass.; Elwood A. Church, to 107 Green Street, Greenwood, Mass.; E. H. Bramhall, to Department of Terrestrial Magnetism, 5241 Broad Branch Road, Washington, D.C.; and Charles A. Bartlett, to 22 West Elm Street, Yarmouth, Maine.

Obey that impulse; sit down tonight and let us have word of your recent activities. — JOSEPH S. HARRIS, *General Secretary*, Aviation Department, Shell Oil Company, Inc., 50 West 50th Street, New York 20, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Stevens-Arnold Company, Inc., 22 Elkins Street, South Boston 27, Mass.

1928

Here is a little information gleaned from a Christmas card which we received from Irl Sandidge: "Technology may have 63 generals in the Army, but here is one alumnus who is still in civilian garb. Although I thought this war was a personal affair for me — M.I.T., engineer, single — I can't make the grade physically. This time last year I was with the Signal Corps at Fort Monmouth, N.J., helping the Army with a special job which was an old problem to a geophysical prospector. Several Texas Oil boys were there, and we finished it in good style. For the past six months, I have been in Charleston, W.Va., estimating the natural gas reserves of the state. We are also involved in the large gas line which is to be constructed from Corpus Christi, Texas, to this city."

Carl M. Loeb, Jr., Vice-president of the Climax Molybdenum Company, is on the staff of the newly appointed molybdenum industry advisory committee of the War Production Board. — John Carvalho, a member of the B.M.C. Durfee High School faculty at Fall River for 11 years, was graduated *cum laude* and received the degree of master of education from Boston University this past summer. John teaches night classes in mathematics at Bradford Durfee Textile School.

It is with extreme regret that we announce the death of Emil O. Malmquist. A year ago last summer he went to Egypt for the government. He was ill all the time he was there. Twisty returned from Egypt to have an emergency appendectomy and was

1928 Continued

not well enough to fight it. He died on September 27, 1942, at the age of 37, leaving his wife, Esther, and two sons, nine and four. The Class extends its sincerest sympathy to his family. We have lost a great friend.

For the first time since graduation, Paul E. Ruch returned to M.I.T. recently for a special meeting of university meteorologists. Bus is running the meteorology department at California Institute of Technology, including the supervision of special Army courses for several hundred students. Also, he and his associates operate a very successful weather forecasting service which has clients as far east as New York State and which has proved of great value to commercial companies, to the Army and Navy, and to fruit growers. — GEORGE I. CHATFIELD, *General Secretary*, 6 Alben Street, Winchester, Mass.

1930

Course IV is well represented in our Navy with Lieutenant Mary Forsberg assigned to the Bureau of Yards and Docks as a camouflage expert and Lieutenant Bob Schildknecht somewhere in the Southwest Pacific. — Chien Wang, VI, is in Washington as a member of the group handling defense supplies for his native China. — Morris Shaffer, VII, is an associate professor of bacteriology at Tulane University. — After a number of years in Rochester with Eastman Kodak, Ralph Peters, X, is now in Oakridge, Tenn.

We regret to announce the passing of three classmates: Arleigh T. Bell, VI, on June 30; Harrison A. von Urff, XV, on September 13; and Paul F. Eckstorm, III, on July 6. Bell was a retired Army captain, while Von Urff was a staff member of the Engineering Societies library in New York. Eckstorm was graduated from Wesleyan in 1918 and had had extensive experience as a chemist before coming to the Institute. Recently he had been engaged in geological and mining engineering and consulting work in New England. Our sympathies go to the members of the families of these classmates.

After a year spent with the Army Engineers in South America, Captain Larry Gonzalez, I, returned home to marry Eileen Ryan of Chicago at Fort Belvoir, Va. Larry and his bride were last reported at Fort Leonard Wood, Mo. — Dave Landen, VI-A, was recently given the Award of Merit for his important role in the production of aeronautical charts for the Army Air Corps. Dave has pioneered in the field of aerial photography for the Geological Survey.

A Christmas card from Jack Latham, II, showed pictures of the children, and your Secretary was pleased — if surprised — to see another Latham (the fourth). Further investigation revealed that Tommie was born on January 18, 1943, four days before your Secretary's first-born. Not to be tied for long, Course XV man became the father of his fifth child in November, and they are all boys. Don Diefendorf is the proud father. An Associated Press dispatch from Syracuse states that no name has been selected, the parents not having anticipated the possible necessity to choose so many names for boys. From Canajoharie, N.Y., Bob Phelan, VII, wrote to announce the birth of his second son, Richard, in June. Since 1936 Bob has been with Beech-Nut and spent three of the intervening years in the Far East. Recently his work has included the packing of K and other rations for the armed forces. (1930 men, please note!) — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass.

1932

News from you fellows is very scarce, and this fact accounts for our absence from these columns for several months. Al Dietz gave two interesting papers on plywood at the meeting of the American Society of Mechanical Engineers. We had a lot to talk about when we got together after the meeting, not having seen each other since '32. At this same meeting I talked with Frank Chaplin, who sat next to me in many classes. He has been married since April, 1934, to Jewel Pierce of Pinetown, N.C., and they have a 22-month-old boy. At present he is on leave of absence from E. G. Budd to work for the Ordnance Department. His home address is 822 Glendalough Road, Philadelphia 18. Last summer he ran into Don Newhall, a captain in Ordnance, stationed at Watertown Arsenal, Watertown, Mass. — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. *Assistant Secretaries:* CARROLL L. WILSON, 1530 P Street, Northwest, Washington, D.C.; WILLIAM A. KIRKPATRICK, Allied Paper Mills, Kalamazoo, Mich.

1937

In December, I made a "flying" trip to Chicago and was fortunate in meeting W. H. Austin, a Navy lieutenant, junior grade. Austin, who is a torpedo officer, is stationed at Davisville, R.I., where he has been since May 20. He married Margaret Dolan on August 27, 1940, and they have two sons — William H., Jr., and Peter Montague. — Walter Paige Ballard, now a first lieutenant in the Army Air Forces, was recently awarded his silver wings as bomber pilot from Frederick Field, Okla.

News has been received of the birth of a son to Major Allen and Edith Hazeltine; the baby was born December 10, weighed seven pounds six ounces, and has been named Colin Rawson. — Your Secretary's "girl Friday" is happy to report that Windy and Alice Johns are the proud parents of a baby girl born January 3, weighing six pounds seven ounces and named Cheryl Mary. This is their second daughter. — WINTHROP A. JOHNS, *General Secretary*, 34 Mali Drive, North Plainfield, N.J. PHILIP H. PETERS, *Assistant Secretary*, 159 Glen Road, Wellesley Farms 82, Mass.

1938

Sad news from the Pacific area reports that Fred Lamb was killed in action on November 8. Fred enlisted as a Navy flier prior to Pearl Harbor and received his wings at Pensacola. From there he was transferred to Corpus Christi and served as instructor in all types of flying until May, 1943, when he was transferred to Floyd Bennett Field. From there he was ordered to sea duty — first in the Atlantic area and then in the Pacific. At the time of his death, Fred was a full lieutenant and the leader of a dive-bombing squadron of nine planes. His unit had downed 10 Jap planes.

Bob Robbins became engaged to Ann Howard in Baltimore in October. He is now a test pilot for Boeing Aircraft in Seattle. — Another October engagement was that of George Thomas to Jean Russell of Great Neck, Long Island. Thomas received his master's degree with us. — John Phinney and his wife, the former Marge Searcy, are the proud parents of a daughter, Georgia Carol. — A son, Russell, Jr., was born to the Russell Coiles on November 5. Russ is a captain in the Army.

Both Jack Wilson and Ciro Scalingi have been promoted from captains to majors in the Army. Ciro, who is in the Air Forces, is stationed in England. Paul King is a second lieutenant in the Air Forces at Hondo Field, Texas. Bob Elliott is finishing up at the new central instruction school, Randolph Field, Texas. He will be assigned to tutor future Axis busters at one of the Army's supervised primary training schools.

Joe d'Angelo writes that he is a first lieutenant in the Ordnance Department, assigned to the overseas expediting section in New York City. He says John Rote was graduated from the Army Air Forces school at Turner Field, Ga. John did so well in his basic training that he was selected the outstanding air cadet of his class. We also have a nice V-mail letter from Fred Grosselfinger. He is a captain in the Army and is now in North Africa. Life over there can't be too bad because he writes about attending an Arab wedding and also about the Sultan, his three palaces, and his harem of 19.

Ely Mencher is no longer with the Escuela de Geologia, Universidad Central, in Venezuela. He is now with the Socony-Vacuum Oil Company but still in Caracas, Venezuela. Harry Draper is with the American Airlines; he is married and living in Boston. Dick Muther, who has written most of our class notes since graduation and who has been at the Institute teaching courses of Professor Fernstrom '10, has left to join the Navy. He is an ensign in the procurement division, and is in Washington for the time being. — DALE F. MORGAN, *General Secretary*, Carbide and Carbon Chemical Corporation, 30 East 42d Street, New York, N.Y. ALBERT O. WILSON, JR., *Assistant Secretary*, 32 Bertwell Road, Lexington 73, Mass.

1940

If any of you were listening to the March of Time a few weeks ago, you no doubt heard our own Jay Zeamer speak on that program. Suddenly hearing the announcer say Jay's name on the radio gave me a great thrill, for I've never had any word from him since he went into the South Pacific a couple of years ago. Major Zeamer has packed a lot into those two years with the Army Air Forces and he has spent a long time in a Washington hospital, but Jay also has been awarded the Congressional Medal of Honor, one of the 12 living men to have received that award. Congratulations, Major!

Continuing with some of the notes which you fellows returned the middle of last year, I've tried to get as many more items in as possible. Captain Norm Klivans had an A.P.O. address in December, being south of the equator and in the weather-forecasting business. He has run into Captain

1940 Continued

Bill Osmun and Captain Tom Bowman. — R. W. Claiborne is working on production problems in the electrolytic refining of copper, silver, and lead in conjunction with the International Union of Mine, Mill, and Smelter Workers. — Leo Pach, who has been with the Elliott Company in Jeannette, Pa., doing thermodynamics work in the research and development department, is now in Trenton, N.J., with the Turbo Engineering Corporation. — When last heard from, Captain B. H. Hale was still in Helena, Ark. He went through basic with Zeamer and reports that Jay once wrote of the New Guinea Fortress flying, "We don't get promotions out here in the minor league." Oh, well, he who laughs last. . . . Bud says he has had no transoceanic flights, but boy the trans-Mississippi ones. — Captain Harry Bushloff has been in the service since July, 1940, as a supply officer. He was hustled onto a boat just two years ago and sent out to a Pacific island where he has been ever since. He says he doesn't mind admitting that he is a little homesick and he is afraid the native brown girls just don't come up to Dottie Lamour standards.

Lieutenant Joe Mahoney, who is with the engineers corps of the Navy, has been out of the United States almost since graduation. He saw a lot of Bill Hart while they were in Newfoundland together. Bill is with the Army engineers. — Until he went into service with the Navy, Lieutenant A. T. Higgins was with Boston Edison. Since that time he has been in the Bureau of Ships, and more recently he has been piloting blimps and acting as engineer officer of the squadron for lighter-than-air craft. The greatest disadvantage he sees in the blimps is the time it takes to get home after being out for 26 hours. — Commander P. R. Lackner is still officer in charge of Navy Weather Central in Washington. — Paul Nims is research engineer with Chrysler Corporation, working on aircraft engines. — G. C. Paulsen was with Merck and Company and we suppose is still in charge of one of the development laboratories. — George O. G. Lof is teaching at the University of Colorado. — J. H. Greenberg is mechanical engineer with the Perfection Gear Company and is instructing classes at the Illinois Institute of Technology during the evenings. — Dave Huber was with the plastics division of Monsanto Chemical Company. — A. E. Joel who received his M.S. at Technology in June, 1942, is now working on telephone switching arrangements and other signal equipment which is secret.

Ed Adams says he's within easy auto, but very long bicycle, distance from all sorts of yachting. He is physicist for Airborne Instruments Lab. — Beano Goodman, a captain last summer, says he is still doing some wrestling, only now he is winning. No one can check up on you very well over in England, I guess, Beano. — Charles deMailly of the artillery branch of the Boston Ordnance district has been promoted to captain. Charley, by the way, is the father of three children now. — H. E. Hawkes has become connected with the United States Geological Survey's program of development of the magnetic iron deposits of southeastern New York, New Jersey, and Pennsylvania. — Ensign and Mrs. Francis Lee are parents of a son.

Captain Don Cole, who has been stationed at Farmingdale, N.Y., is now at Fort Devens. Recently he has heard from First Lieutenant Gordon Fairbairn, now seeing action in Italy after a tour of duty in North Africa and England, and also from Charlie Lindblom out at Lockheed. He asks for more news of other Course XVI men. — Frank Penn has returned to Boston to work with the National Research Corporation. We hope eventually to get a detailed report of what he is doing there. — H. GARRETT WRIGHT, *General Secretary*, 1124 Greenwich Street, San Francisco 9, Calif. THOMAS F. CREAMER, *Assistant Secretary*, Apartment 436, 2032 Belmont Road, Northwest, Washington, D.C. JOHN L. DANFORTH, *Acting Assistant Secretary*, Room 24–222, M.I.T., Cambridge 39, Mass.

1941

The one notice in the marital grab bag was that of the engagement of Shirley Lehrer to Ed Weinberger. I'm afraid there just aren't any more unattached men in the Class. Take it back — we have set up a tentative weekly class get-together here in New Orleans, and nearly all concerned are holding their own along the marital front. Fred Lykes is working for the Lykes Brothers Steamship Company in the Crescent City. Vic Wolf is a lieutenant in the Air Forces, stationed at the New Orleans air base. Curt Buford '42 is a captain in the Transportation Corps unit training center here at Camp Plauché. Ed Murphy is a section engineer for the Linde Air Products Company and is covering the southern area. Of them all, Hank Hamilton is the lone married individual. Hank is a lieutenant in the Navy and is supervising work at Todd-Johnson Dry Docks, Inc.

Vic was one of the first men, back in '42, to go across. At that time we mentioned Kirke Marsh and Dick Langworthy as having crossed to England for experimental and development work. Since then Kirke, and then Vic, have returned to the States. Of Dick we have not heard. Vic then instructed at a station in Kentucky and later landed in Mardi gras town. We were looking for a nickel for a telephone call at twelve on New Year's Eve (place: the Roosevelt Lobby), when someone tapped and asked that question you've got such a kick out of hearing, "Say, did you go to M.I.T.?" Needless to add, we owe Vic a nickel.

We received a letter from Edythe Baum saying that Bob Alfred is still in Africa or thereabouts; a card from Dorothy and Luke Hayden, who is an ensign in the United States Naval Reserve; and one of those peculiar V-mail jobs from Ken Bohr in Britain. — Possibly a rhetorical question, but nevertheless a query, came from Jud Rhode '40, last heard from at Du Pont in Wilmington: "How was New Orleans?"

We were surprised and pleased to hear from Bill Ahrendt: "I am living at home [Westfield, N.J.] and have spent my time in the interval working for the Curtiss-Wright Corporation, propeller division, Caldwell, N.J. I am now employed by the Lawrance Engineering and Research Corporation, Linden, N.J. My only other consistent activity is teaching an Engineering Science and Management War Training course in automatic control at the Newark College of Engineering three nights a week. Marital status — none. So far, I have had visits from a number of our illustrious classmates, among whom were P. M. Erlandson now a lieutenant, junior grade. Like me, P. M. swore he would never practice engineering after he left the Institute. He is now engineering for the Navy in Washington. Bob Mayer, one of the General Electric boys, dashes around the country on automatic control problems. Bob Edwards is still Sperry Gyroscoping, wearing his pantseat out riding a victory bicycle to work. Paul Sanderson is in Pittsburgh and writes that John Potter is now in Hawaii — with the United States Army, of course. I saw John Murdock at Mitchel Field on a recent visit and also saw Van Van Greenby. Leon LaBombard just got married a short time ago. Lee is working for Curtiss at Caldwell. Frank Langhammer, who is with Bell Labs in New Jersey, recently took the big step, too, and has introduced me to his bride."

Among the most recent bits of information we find Captain Jim Healey at Dayton, Ohio, and Lieutenant Harry Heimer at California Institute of Technology with Lieutenant Ted Walkowicz. Lieutenant Rudolf Hensel and Captain Bob Williams are listing that same Pasadena address — it must be some place, this Cal Tech. Captain Dave Howard is A.P.O.ing out of New York City, as are Captain Joe Andino and Lieutenant Carl Aronsen; Captain Johnny Hanssel, out of Los Angeles; and John Lyons, now a major, out of New Orleans. Ted Ferris is an ensign and is using a Rochester, N.Y., address. Dick Gill is a major at Mitchel Field. Lieutenant Vincent Kling is with the Navy at Norfolk, Va. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester 21, Mass. JOHAN M. ANDERSEN, *Assistant Secretary*, 136 Beacon Street, Boston 16, Mass.

1942

With the Class now two graduations away from Jakie's and the Statler bar (except sometimes), the March winds seem to have blown a couple of letters our way. Heading the list, probably for the sheer novelty of it all, is a momentous memento by the Horrible Hawk Shaw, who is keeping his little green men over in some Harvard dorm or something: "At the Army-Navy Ball, I ran smack into Johnny Carleton, an ensign. John looked very comfortable in his blues, and bade me tell any classmates who needed drag in the United States Navy to drop him a line. I think he said he was in charge of the Atlantic fleet or something. Philthy Phil Phaneuf also showed up with a small leave a while back. He had been growing sleek and fat in the hinterlands of Arkansas — also horns.

"As for me, I am essentially a college boy, although they call me 'Private.' The military is very much at ease here at Harvard Medical, and we have a splendid, broad-minded commanding officer. They do keep us busy, but it is so much fun that we don't mind the pain. In addition to the regular curriculum and a little drill, we have four hours a week of military medicine under the Army. This includes some very interesting stuff on war neuroses and treatment of them, a certain amount of paper work, and the study and control of venereal disease."

From Ensign Brad Darling, "still quite single," comes word of many of the lads:

1942 Continued

"At last report Jack Finger, II, now a lieutenant junior grade, was at Tiburon, Calif., a floating dry dock training center, acting as instructor for a class of enlisted men. Pete Sibley, XVI, could be anywhere now, and probably is. He is still a flight engineer with Pan American, and has seen a lot of Miami, Fla.; Natal, Brazil; and various points east. From talking with his folks, I gather that he's had some interesting experiences, although, like others, he can't give many details. His recent engagement is probably the biggest thing in his life now, however; and if I know Pete, he's spending 100 per cent of his time in the clouds.

"To explain my present predicament, I had best start from the standard reference point — April, 1942. From then until four months ago, I was with the Atlas Powder Company: first, as a trainee at Tamaqua, Pa., for a couple of months; then, at their Weldon Spring TNT plant in St. Louis for five months. While in that city I saw something of fraternity brother Gordon Neumann, XV, who is with Curtiss-Wright. December, 1942, saw the completion of Atlas' newest TNT plant, the Kentucky Ordnance Works, which was to be my final destination. So I left the bright lights of St. Louis for the rather unglamorous town of Paducah, Ky. In the nine months that followed I saw the plant get gradually under way, starting from scratch; it reached full production at about the time I left. For example, the control laboratories, with which I was connected, grew from an original force of four chemists to a total of 21. While I was in Paducah, Ken Leghorn (then a lieutenant) paid a surprise visit, flying up one afternoon from Walnut Ridge, Ark., with a group of his students, on a cross-country hop. He made the mistake of flying over the plant, however, and was frowned upon slightly, so that those trips were subsequently diverted, and he didn't get back again. Captain Leghorn is now overseas with the Air Transport Command.

"It was planned that eventually the assistants whom we had trained (all women) should take over the labs; seeing an opportunity, therefore, in the United States Naval Reserve, I applied, was accepted, and after completing two months of indoctrination at Fort Schuyler, N.Y., find myself in the middle of a four-month course in electronics at Princeton. For an unenlightened Course V man without even the benefit of 6·40, I've found the going fairly rough but expect to pull through, although I'm scheduled for another workout at the Institute after this is over. What makes the work hard is the rapidity with which it is thrown at one. There is a man who claims to have missed the entire review of integral calculus when he dropped his pencil in a lecture. Jerry Coe is here, too, and giving a good account of himself, as any of his classmates would expect, by being one of the select few who are going through in three months instead of four."

Donn Barber, back in the wintry blasts of Bermuda, after a quick tour of the highlights of New England and New York City, says: "The leave was wonderful, but no great results. I am still single and unattached, so you have nothing for the gossip columns. I did get to Boston for a few days. Earle Foote and I fooled away a great bit of the spare time in the evening — by day he attends Harvard as a lieutenant in the Marines studying electronics. (How could he!) I was also led around, not through, the Institute by Charlie Peck, who still labors at teaching. I was amazed at the various structures which were sitting all over the place (and they thought the old hangar gym was bad). These aren't really too bad, but they sure were surprising. By the way, the Statler bar is still as good as ever, but more and more expensive.

"The Hendersons came through while I was at home. Jean stayed in New York with her folks while Hank was in Dayton on business, but we finally arranged for him to meet Jean in New York and come up home for dinner. It worked out, and we had a swell talk. I *drove* them back into town and put them on a train for Philly — baby and all. They have a really cute kid."

A news flash says that Ed Vetter, big man in Army Ordnance, is now a captain and a large-scale operator out Yermo, Calif., way. Hank Titzler, an Army lieutenant, tells of Bill Schoen, now a captain, who is in England with a repair outfit of some sort. As for that old slippery, Jack Arend, an Army lieutenant stationed at Clovis, N.M., your Secretary is looking forward to seeing him again soon, either at Roswell, or at Clovis. We may find him in the Carlsbad Caverns, where he has probably unearthed a ten-year-old cache of Seagram's V.O. and is well on the way to becoming a hermit. See you next month, and let's have bigger, more frequent, and just more letters from more of us. — FREDERICK W. BAUMANN, JR., *General Secretary*, Orchard Lane, Golf, Ill. KARL E. WENK, JR., *Assistant Secretary*, 228 Marlborough Street, Boston 16, Mass.

1943

Since the last issue of The Review, I have changed status from student to teacher, having been assigned to the Ordnance school at Aberdeen. Also here, but assigned to the Ordnance research center, are Eliot Payson and Curt Smith. Eliot and I met Lieutenant Gus Smith in Washington in January. Gus has been assigned to a division in Tennessee but will remain in these parts until he finishes a couple of Army engineer courses. He said that Stan Roboff and Bud Babcock were also heading for Tennessee shortly on a mission of great secrecy. Bud was married recently, but all essential details will have to wait until a future issue of The Review. While we were in the nation's capital, we ran into Lieutenant Jim McDonough. Jim was graduated from Engineer Officer Candidate School just before Christmas and is now assigned to the Engineer Board at Fort Belvoir. Lieutenant Munny Lee was graduated with Jim and is headed for a combat engineer unit on the West Coast. Also recently moved in, so to speak, on the Wild West is David Sprenger, who is an aviation cadet at the Enid Army Flying School in Oklahoma.

Via a New York newspaper, word comes that Captain Gerard Shuchter, who was commissioned in the Royal Canadian Air Force and then transferred to the United States Marine Corps, has returned from the South Pacific and is now on the general staff of the Fighter Command. We hear that he and Jessie Wallace are engaged. Lieutenant Arthur Mestier and Dorothy Dickens have likewise made known their intentions. Even I, chronicler of these joyous tidings, have finally succumbed to the inevitable by getting engaged to Betty Williams. Dorothy Faeder became Mrs. John M. McMillin, Jr., early in November, and about a month later, Elizabeth Higgins changed her name to Mrs. Edward Czar. Both John and Ed are ensigns.

John H. Lutz, who lays claim to membership in 1943 by virtue of a doctor's degree, has been appointed a research staff project leader in charge of packaging research for the General Foods Corporation. Chemical engineers will remember him especially from 10·18, 10·28, and a few other courses, while the wrestlers of the Class will know him as wrestling coach.

Ensign Wilfred Kaneb, who is at the Navy air training center in Pensacola, Fla., says: ". . . A fellow gets out of touch in a hurry down here, especially when he is moved around so much." — I have a masterpiece of brevity from Lamar Fleming, a lieutenant, who writes: "At present I am learning the jobs of a B-26 pilot and expect to be doing the same for a few months yet."

Finally, I have a long letter from Johnny Gardner: ". . . There are quite a few of us working for Standard and, one way or another, I think you can say our work is all tied up with producing more of that go-juice called '100 octane.' Bill Franklin, Jack Kelly, Andy Kean, and I are all in the technical service division at the Bayway refinery, while Barrett Russell is in the research division of the Standard Oil Development Company, also at Bayway. At the present time, however, Russ is doing some work at our refinery at Baton Rouge, and Franklin is temporarily located at the Baltimore refinery. Harry Ottinger is permanently located with the Standard Oil Company of Louisiana at Baton Rouge, while I understand from Franklin that Bob Richmond is working at the Baltimore refinery.

"On January 9, I saw Jack Kelly get married in Jamaica, Long Island. Gus Smith was best man, and Andy Kean was one of the ushers. Incidentally, I've been married for over nine months to the former Jane Kipp of Peoria, Ill. Frank Briber, as you undoubtedly know, is, or at least was, doing research work at the Institute, but early this year he planned to be a Navy man.

"There must be quite a gang of us '43 men in or near New York City. If we only knew about one other, we might be able to get together for some 'steins on the table' or something in the Big City. I thought that if you knew the addresses of some of the boys around here or knew at least their names and that they were in this part of the universe, perhaps you'd pass the information on to me and we'd see if we couldn't cook up something."

I have now as nearly up-to-date a record of the whereabouts of all the Class as I shall ever get in these days. So if you want a list for your area, write me for it. But don't you dare write me without filling your letter full of news of your own doings and those of others you have seen or heard from. — CLINTON C. KEMP, *General Secretary*, Barrington Court, 988 Memorial Drive, Cambridge 38, Mass.

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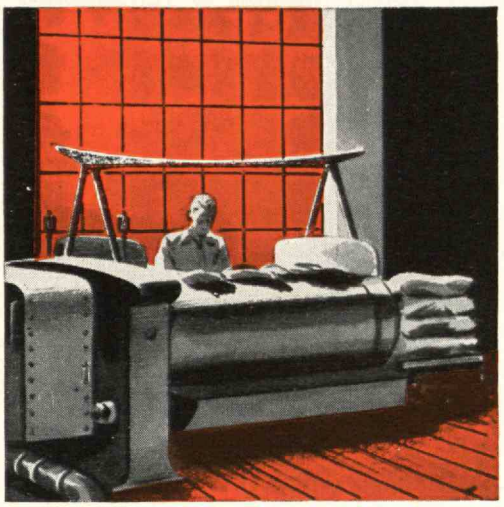

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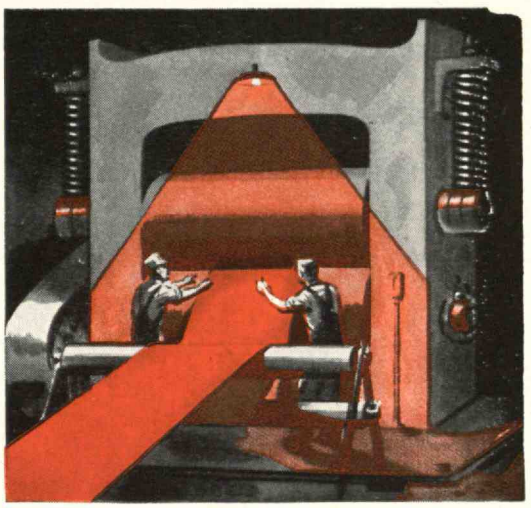

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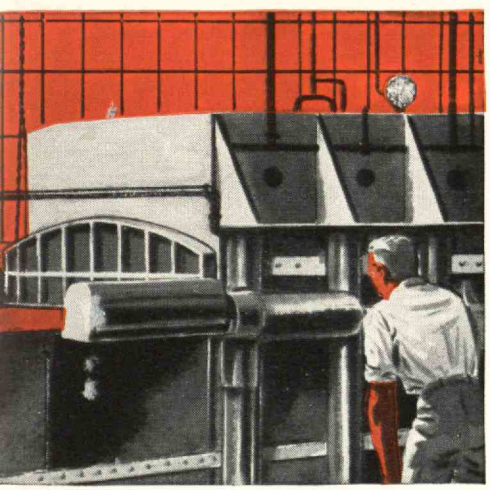

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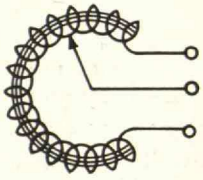

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